ASSESSMENT OF NASAL SCALE AS A PREDICTOR OF DIFFICULT INTUBATION

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I hereby declare that the thesis entitled "**ASSESSMENT OF NASAL SCALE AS A PREDICTOR OF DIFFICULT INTUBATION**" submitted towards partial fulfillment of the requirements for the award of **MD ANAESTHESIOLOGY** degree to BFUHS is a compilation of original work carried out by me under the supervision of **Dr. Kamakshi Garg,** Professor, Department of Anaesthesiology, **Dr. Sandeep Kundra** Professor, Department of Anaesthesiology & **Dr. Hitant Vohra,** Professor & Head, Department of Anatomy. No part of this thesis has formed the basis for the award of any degree previously.

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Dedicated

to

my family

&

Teachers

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COMMIT TO THE LORD WHATEVER YOU DO, AND HE WILL ESTABLISH YOUR PLANS. Successful completion of a task is often less due to individual talent than to the fact that the person has been blessed by the 'GOD ALMIGHTY'.

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Dr. Anubala Kainth

ABBREVIATIONS

ROC	Receiver operating characteristic curve
MMP	Modified Mallampati
SMD	Sternomental distance
TMD	Thyromental distance
NS	Nasal scale
AMF	Airway Management Foundation
CL	Cormack Lehane
AUC	Area under curve
PPV	Positive predictive value
NPV	Negative predictive value
BMI	Body mass index
DL	Direct laryngoscopy
ASA	Anesthesiologist physical status
%	Percentage
EMS	Extended mallampati score
Cm	Centimetre

ABSTRACT

Introduction: Airway assessment is mandatory for anesthesiologist as the first step towards successful airway management so as to identify a potentially difficult airway and make necessary preparation to deal with it. Airway assessment methods such as Mallampati classification, sternomental distance, thyromental distance forms an important role to predict difficult intubation however these methods suffer from various limitations. A new airway assessment method Nasal scale has been proposed as a predictor of difficult intubation.

Aim of Study: To evaluate the predictive potential of Nasal Scale for difficult intubation and to compare the sensitivity and specificity of Nasal Scale with regard to Mallampati classification, thyromental distance, sternomental distance.

Materials & Methods: Patients older than 18 years of age scheduled for elective surgery under endotracheal general anesthesia will be included in the study. A total of 200 patients fulfilling these criteria will be enrolled in the study.

Clinical Significance: Difficult Intubation is known to have incidence varying from 0.8% to 7% in patients undergoing surgery. An accurate preoperative prediction of difficult intubation helps in reducing airway related complications.

Results: The value for the area under the ROC curve was 0.734 for NS. The sensitivity of MMP (86.7%) was found to be higher than NS (80%), SMD (33%) and TMD (40%).The accuracy of NS (63.5%) was similar to MMP (60.5%) and SMD (64%) respectively) and lower than TMD (70%).

Conclusion: Nasal scale could be an indicator for difficult tracheal intubation. Nasal scale can be used in combination with other methods as new assessment test for prediction of difficult intubation

Keywords: Nasal scale, Mallampati classification, thyromental distance, sternomental distance and difficult intubation.

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INTRODUCTION

Airway management is of prime importance to an anaesthesiologist.[1] Tracheal intubation through direct laryngoscopy is the gold standard for securing the airway.[2] During intubation the anaesthesiologist uses the laryngoscope blade to displace the tongue and other soft tissues of the mouth to achieve the best view of glottic opening but inadequate visualization of the glottis makes the intubation difficult.[3] Difficult airway is defined by American Society of Anesthesiologists as the clinical situation in which anticipated or unanticipated difficulty or failure is experienced by a physician trained in anesthesia care, including but not limited to one or more of the following: face-mask ventilation, laryngoscopy, ventilation using a supraglottis airway, tracheal intubation, extubation, or invasive airway.[4] In patients undergoing general anaesthesia, an incidence of difficult intubation of (1.5–8.5%) has been reported. The incidence of failure to intubate is reported as 0.1 to 0.3%. Difficult intubation causes high risk of complications ranging from sore throat to airway trauma. In few cases, if anaesthesiologist is unable to maintain the airway patency, the dreaded nightmare for any anaesthesiologist so called 'cannot intubate- cannot ventilate' situation, may lead to serious complications like hypoxic brain damage or death.[5]

Prediction of difficult airway is of greater importance now than ever due to wide availability of airway management equipments and it also helps in judicious use of these airway adjuncts.[6] Pre operative assessment of the airway is routinely done to identify factors leading to difficult facemask ventilation, supraglottic airway device insertion, tracheal intubation which helps in identifying problems before surgery leading to proper planning and preparation prior to surgical procedure and in turn decreasing the risk of complications.[7]

Thus, performing a thorough assessment airway assessment

preoperatively to identify a potentially difficult intubation is of pivotal importance for the anaesthesiologist.[7] This involves a series of manoeuvres like extending the head, flexion at lower cervical spine, adequate opening of mouth, left side displacement and lodgement of the tongue on the floor of the mouth and lifting the mandible forward. The ease of difficulty in performing each of these manoeuvres can be assessed by one or more parameters. The airway assessment was carried out by methods like Mallampati test, thyromental distance, inter-incisor gap, sternomental distance to create a scoring system.[8-11] By adapting these methods one can overcome anticipated difficult intubation with much better accuracy. Compared to any single test, multifactorial tests and combinations of multiple unifactorial tests alter both the sensitivity and specificity of detecting difficult airway, but outcomes are variable. Till date none of the airway assessment methods can ensure proper identification of all difficult airway situations.

Thus, the search for a predictive test that has ease of applicability, reliability and accuracy of prediction continues. With the application of these airway predictive factors one can identify, true positives, (those who are predicted and had difficult intubation), false positives (those who are predicted difficult intubation but had easy intubation), true negatives (those who were predicted to have easy intubation and had easy intubation) and false negatives (those who were predicted to have easy intubation but had difficult intubation). Using this concept one can determine how sensitive and specific these tests are and also obtain the positive and negative predictive values of these tests.[12]

A meta-analysis of various studies on Mallampati test found that both the original and modified Mallampati tests have limited accuracy for predicting difficult airway. Savva evaluated various clinical tests as predictors such as modified Mallampati test, thyromental distance, forward protrusion of mandible, sternomental distance and concluded that the sternomental distance appeared to be more sensitive and

specific than thyromental distance, modified Mallampati test and forward protrusion of mandible.[8]

Despite a plethora of studies, accurate predictors of difficult laryngoscopy and difficult tracheal intubation have not yet been developed. These individual tests have high rates of false negative and false positive results and thus cannot be considered to be exclusively predictive of intubation difficulty. Few studies have used radiological parameters to predict difficult intubation. In a study by Frerk et al x-ray findings were used to detect difficult intubation. But radiological techniques are time consuming, costly and cannot be routinely employed.[13]

Airway Management Foundation (AMF) proposed a new approach to airway assessment, the AMF Approach. This approach offers a step ahead of the currently prevalent methods as it prompts the airway manager to view any difficult airway in the light of not only the patient factors but also the non patient factors.[14] The model is based on an organized “line of sight” method .The assessment of the patient mainly consists of three steps: focused history, focused general physical examination and focused airway examination using AMF "line of sight "methods. The assessment findings categorize the areas of airway management as available, difficult, and impossible; difficult being optimizable as against impossible that is not optimizable.[14]

As the prediction of a difficult intubation is not dependent on a single parameter, so a new method, “Nasal scale score” was studied by Bostan et al as a predictor of difficult intubation.[2] They calculated this scale on their subset of Turkish population by measuring the distance between radiix nasii and nasal tip and then dividing it with the distance between two alar cartilage domes; i.e. longitudinal distance is divided by vertical distance and expressed as a number within a range of 1.22-2.3. They found Nasal scale score < 1.4 as a predictor of difficult intubation.[2] This is a quick and easy to perform bed side test done

with the help of measuring tape. The instructions required for both the observer and patient are extremely easy. Thus there is less probability of mis-interpretation while performing this test. This test may also become a useful tool in patients who are not able to comprehend with the anaesthesiologist commands like certain syndromic patients or mentally retarded patients. It has been seen that higher incidence of difficult intubation occurs in human beings with typical nose structure as varied sizes and shapes of noses are seen amongst different individuals. Literature is scarce in use of this Nasal scale score as a predictor of difficult intubation in Indian population. Hence we propose to employ Nasal scale score in our subset of population and compare it with Mallampati classification, sternomental distance and thyromental distance in terms of predicting the difficulty of intubation as determined by Cormack–Lehane (CL) classification.

AIMS AND OBJECTIVES

To evaluate the predictive potential of Nasal Scale for difficult Intubation.

To compare the sensitivity and specificity of Nasal Scale with regard to Mallampati classification, Thyromental distance and sternomental distance.

REVIEW OF LITERATURE

ANATOMY OF THE AIRWAY

Anatomically, respiratory tract is divided into upper that is (nose, pharynx and larynx) and lower respiratory tract that is (trachea, bronchi, bronchioles, alveolar duct and alveoli). Nose and nasal cavity are divided into two halves by the nasal septum. Nasal passages open posteriorly by the way of posterior nares or choanae into the nasopharynx. The nose develops from the pharyngeal arcus, which is the stem of the neck, mandible and face. The different anatomic structures of head and neck and upper airway help in predicting difficult airway. Oral cavity opens into oropharynx. The pharynx is a tube like passage that connects the posterior nasal and oral cavities to the larynx and oesophagus. It is divided into nasopharynx, oropharynx and laryngopharynx. fig.(1)There are three narrowest portions of pharynx; passage posterior to the soft palate (retro palatal space), passage posterior to the tongue (retroglossal space) and passage posterior to epiglottis (retroepiglotic space). [15]

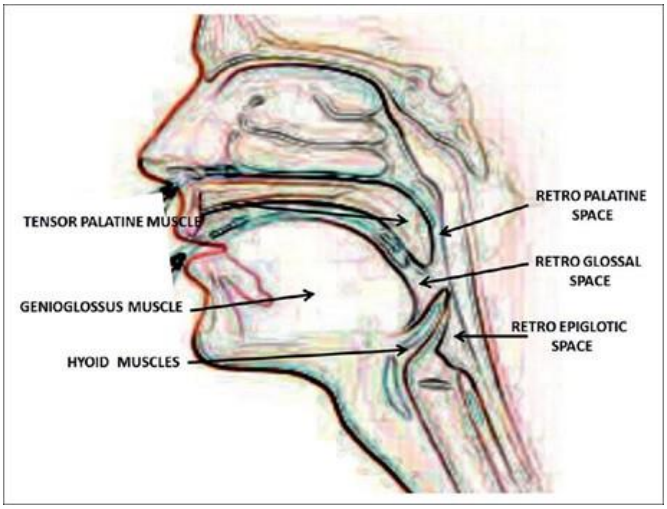

Fig.(1) Pharyneal Muscle

Tongue, which occupies maximum part of oral cavity, is the principal source of oropharyngeal obstruction; usually because of decreased tone of genioglossus muscle. Fig (2) Larynx lie at level of third to sixth cervical vertebrae and serves as an organ of phonation and sphincter,

transmitting air from oropharynx and nasopharynx to trachea. It also serve as a valve to protect the lower airways from the contents of alimentary tract.[15]

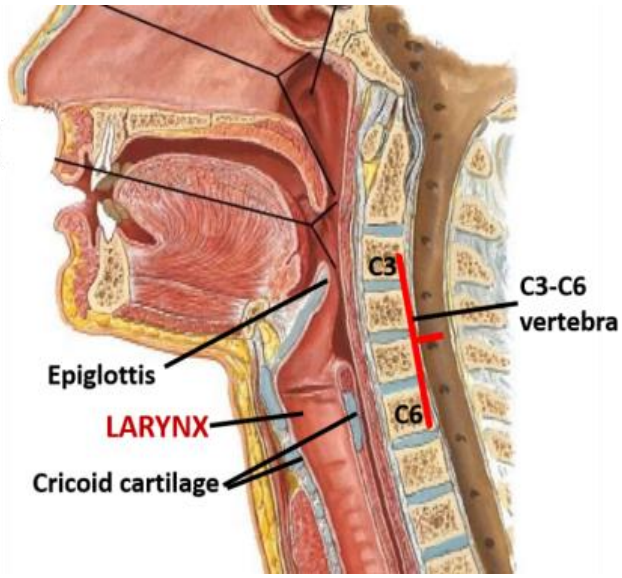

Fig. (2) Larynx

Sedation, sleep, anesthesia and coma all reduce or abolish the tone of the upper airway and impair ventilatory drive. Brouillette and Thach showed that the closing pressure of pharynx is about 80 cm of water when sedated. Inspiration and expiration in awake patients do not alter the saggital airway configuration but in anesthetized patients inspiratory efforts tend to cause pharyngeal collapse. [16]

In a study conducted by Nandi et al it was seen that there was a reduction in antero posterior diameter of the pharynx in sedated patients particularly at the level ofthe tongue, epiglottis and soft palate. Median change of soft palate was 1.3 cm, tongue base was 6.5 mm and epiglottis was 3.8mm. [17]

Murphey et al studied the effect of diazepam on the upper airway reflex sensitivity (UARS) and established that there was a significant depression of UARS with diazepam. Boiden MP explored the airway patency in patients breathing spontaneously under deep halothane anesthesia. Result of the study indicated that the epiglottis and not the

tongue is the main cause of obstruction of upper airway.[18]

In a study on cats, Nashino et al showed that normal phasic genioglossus electromyogram and hypoglossal nerve activity are depressed in response to increasing depth of anaesthesia.[19]

Drummond studied the changes in surface electromyogram of tongue and neck muscles before anaesthesia and during sedation with i/v thiopentone and established that there was loss of tonic activity of muscles and this was associated with airway obstruction.[20]

In the awake patient, airway is maintained by the tone of the muscles of the neck, pharynx and tongue. Loss of consciousness results in loss of this muscular tone and tongue falls back to obstruct the airway. If the patient is supine this obstruction can be complete and without intervention, potentially fatal hypoxia will ensue. Airway control is therefore one of the most basic skill taught to trainee Anesthesiologist. Upper airway obstruction is common during both anaesthesia and sleep. The velopharynx, a particularly narrow segment is especially predisposed to obstruction in both states.[21]

According to American society of Anesthesiologists Task Force a difficult airway is defined as the clinical situation in which a conventionally trained anesthesiologist experiences difficulty with face mask ventilation of the airway, difficulty with tracheal intubation or both. The difficult airway represents a complex interaction between patientfactors, the clinical setting and the skills of the practitioner.

The methodology of different airway assessment tests like mallampati classification, thyromental distance, sternomental distance originated from the anatomical structure of oropharynx and neck; therefore, it is possible that its dimensions and anatomical shape may correlate well with the nasopharynx and neckthat form the airway. [22]

Patients scheduled for general anesthesia may present with difficulty at intubation. Preanesthetic examination of the airways is of utmost importance for an anesthesiologist in assessing the risk of difficult intubation Depending on many patient characteristics and circumstances, difficulty and delay at intubation may cause or increase risks of hypoxia, hypercarbia, direct airway trauma ,brain damage and myocardial cell damage.[10,11] Mallampati classification, thyromental distance, sternomental distance, mouth opening, protrusion of the mandible, position and size of teeth, stability and elasticity of the atlanto -occipital joint are still used to evaluate the airway during the preoperative visit.[9]

Gillepsi, stated that large men with wide, short necks and in patients with long high arched palate, protruding incisor teeth and short receding mandibles , exposure of the glottis is difficult by direct laryngoscopy.[23]

Mather described several pathological conditions of the soft and bony tissues which may render laryngoscopy difficult or impossible e.g trismus, cervical spondylosis neck contractures, scleroderma, temporo mandibular arthritis/ ankylosis, klippel Feil syndrome, achondroplasia and neoplasms of the oropharynx. He suggested that a suitable nasal tube, as well as an introducer for facilitating intubation with oral tubes should be made available before induction of anaesthesia in such patients. He also stressed the usefulness of blind nasal intubation in such cases.[24]

Brechner MD suggested that attention be directed to flexion extension mobility of cervical vertebrae as part of the clinical examination prior to attempting endotracheal intubation. He presented five cases in which difficulty was encountered because of restricted mobility to flex and extend the head .The cases had fusion of occipital joint and loss of lordotic curve, Crouzon's disease, limitation of mobility following burns

or Klippel -fleil syndrome (deformity of C - spine).[25]

Charles Block and Brechner suggested that the numerous acquired and development conditions of the temporomandibular joint, the mandible and associated structures can and do influence endotracheal intubation. Conditions described were congenital anomalies (Pierre Robin syndrome, Treacher collins syndrome, unilateral facial agenesis, Romberg' s syndrome), acute and chronic inflammatory conditions (rheumatoid arthritis) of temporomandibular joint, juvenile rheumatoid arthritis or stills disease, ankylosing spondylitis, degenerative arthritis), infections of the masticator space ,lateral pharyngeal space ,Ludwig's angina , carcinoma tongue and fracture mandible. The risks for predicting the difficulty intubation can be lowered by allowing for more planning and the appropriate preparation of required equipment. Unanticipated difficult airways must be managed very promptly since the patient is usually apnoeic, deeply anaesthetised and usually paralysed.[26]

Rakesh et al proposes a new approach, the AMF approach.In this approach Assessment of patients airway is done through focused history, focused general physical examination and focused airway assessment using the AMF "line of sight" method. This method is non mnemonic, non score based where examiner examines the airway along the line of sight as it moves over the airway and note down all the variations from the normal and assessment of non patient factors follows after that. There is assimilation of all information to identify available, difficult and impossible areas of airway management. It is not only intubation centric approach but also focuses on all other methods of securing airway and maintaining oxygenation.[14]

Prakash et al conducted a cross-sectional observational study in 300 adult surgical patients requiring tracheal intubation. They studied thyromental height (TMH) as a predictor of difficult laryngoscopy and difficult intubation and compared TMH, ratio of height to thyromental

distance (RHTMD), and thyromental distance (TMD) as predictors of difficult airway. They concluded that Thyromental height predicts difficult laryngoscopy and difficult intubation.TMD and RHTMD did not prove to be useful as predictors of difficult airway.[27]

In 2018 Mallhi et al conducted a prospective observational study to determine the sensitivity and specificity of Modified Mallampati test alone, Thyromental distance alone and in combination of both for predicting difficult intubation. which involved 80 American Society of Anesthesiologist Physical Status (ASA PS) I patients undergoing elective surgeries under general anesthesia with endotracheal intubation. All patients were included for preoperative assessment by Modified Mallampati test alone and Thyromental distance measurement. The correlation between these tests and Cormack and Lehane laryngoscopic grading was done .This study concluded that sensitivity to predict difficult intubation was higher with Modified. Mallampati test alone or in combination with Thyromental distance test whereas specificity was highest with Thyromental distance test alone.[28]

A meta-analysis on prospective studies of patients undergoing general anesthesia was done by Lee Anna et al in which the results of preoperative Mallampati test and modified Mallampati test were compared with subsequent rate of difficult intubation. The meta-analysis included forty two studies enrolling 34513 patients. It showed that for predicting difficult intubation modified Mallampati had better accuracy than original Mallampati test. However, they concluded that both the Mallampati tests had limited accuracy for predicting the difficult airway when used alone and thus were not useful screening tests.[29]

Oates et al compared the two methods for predicting difficult intubation prospectively. Mallampati classification and Wilson risk sum were

determined before operation in 675 patients. Both tests identified five of 12 difficult laryngoscopies. Interobserver variations was minimal using Wilson risk–sum than Mallampati .They concluded that Wilson risk-sum would be preferred for assessment of airway while noting that both tests have poor sensitivities.[30]

Mashour et al proformed a prospective study on 346 morbidly obese patients and compared the extended mallampati score (EMS) with Modified Mallampati classification (MMP) for difficult laryngoscopy. They concluded that Extended Mallampati score was superior to Modified Mallampati classification in the prediction of difficult laryngoscopy. This study also supported that morbid obesity itself was not a predictor of difficult intubation but a diagnosis of Diabetes mellitus was also a predictor of difficult laryngoscopy.[31]

Savva D conducted a study on “Prediction of difficult intubation” on 350 consecutive patients scheduled for surgery under general anaesthesia with tracheal intubation and assessed them by measuring thyromental distance and sternomental distance, mandibular protrusion and inter-incision gap with mouth fully open. A sternomental distance of 12.5cm or less with head fully extended and mouth closed predicted difficult tracheal intubation in 14 of 17 patients. According to their study sternomental distance appeared more sensitive and more specific than thyromental distance test and mandibular protrusion test. They concluded that sternomental distance may be useful bedside screening test for preoperative prediction of difficult tracheal intubation.[8]

Tanck et al conducted a study to develop a multivariate analyzing factors for stratifying the risk of difficulty in intubation. They evaluated 10,507 patients prior before anaesthesia with variable parameters like thyromental distance, neck movements, mouth opening, body weight,

able to prognath the mandible and any other previous history of documented difficult airway. After induction of anaesthesia and ability to mask ventilate the patient, and Cormack-Lehane grades were recorded. They concluded that the difficultly in airway as graded by Cormack–Lehane grading during direct laryngoscopy can be assessed by diligent preoperative multivariate risk index.[32]

Shiga et al conducted a study to assess the accuracy of clinical airway assessment for identifying difficult intubation. They selected previously done studies from data bases. The total studies chosen were 35 and the total patients included were 50,760.The clinical assessment tests used in this study were Mallampatti test, thyromental distance, sternomental distance, mouth opening and Wilson's score. The sensitivity and specifity of each test was calculated individually. The individual sensitivity for each test was 20% to 62% which means the sensitivity was poor. The individual specifity for each test was 82% to 97% which means the specifity was moderate. On calculating the positive likelihood ratio for combination of test, it was found that Mallampatti test and Thyromental distance was useful. They concluded that the individual clinical assessment tests were poor tools in identifying difficult intubation and the combination of tests improves the diagnostic ability.[33]

Cormack et al described the classification of the laryngeal view to denote the degree of difficulty with intubation. They graded laryngeal view into 4 grades depending on the exposure of larynx at laryngoscopy as Grade I: both the vocal cords visible, Grade II: Only the posterior commissure is visible, Grade III: Only the epiglottis is visible and Grade IV: None of the above structures are visible. They realized that grade III and IV cases are often not recognized preoperatively. So most anaesthesiologists will not be able to face this problem and also will not have sufficient experience of handling such difficult situations. Hence they advocated the conversion of grade I or II view into grade III or IV during routine laryngoscopy, so that intubation

has to be performed with difficulty which will help at the time of real difficulty – the concept of simulated difficult intubation.[34]

Mallampati et al proposed a clinical sign to predict difficult tracheal intubation. It was described as the concealment of faucial pillars and uvula by the base (posterior part) of the tongue, when the tongue is maximally protruded in a seated patient. Adult patients with an ASA physical status 1 or 2, who required general endotracheal anaesthesia, were included in the study. Patients were divided into three classes; Class 1 - Faucial pillars, soft palate and the uvula could be visualized, Class 2 - Faucial pillars and the soft palate could be visualized, but uvula was masked by the base of the tongue and Class 3 – Only the soft palate could be visualized.

Their results were highly significant ($p < 0.001$) and supported their earlier hypothesis that difficult laryngeal visualization can be predicted in most cases by this test.[35]

Roth et al estimated the diagnostic accuracy of commonly used bedside examination tests for assessing the airway in adult patients without apparent anatomical abnormalities scheduled to undergo general anaesthesia. They included 133 studies (127 cohort type and 6 case–control) involving 844,206 participants. Pre-specified tests were: the Mallampati test (6 studies); modified Mallampati test (105 studies); Wilson risk score (6 studies); thyromental distance (52 studies); sternomental distance (18 studies); mouth opening test (34 studies); and the upper lip bite test (30 studies).Difficult facemask ventilation, difficult laryngoscopy, difficult intubation and failed intubation were the reference standards in seven, 92, 50 and two studies, respectively. Across all reference standards, they found all index tests had relatively low sensitivities, with high variability, but specificities were consistently and markedly higher than sensitivities. For difficult laryngoscopy, the sensitivity and specificity (95%CI) of the upper lip bite test were 0.67 (0.45–0.83) and 0.92 (0.86–0.95), respectively; upper lip bite test sensitivity (95%CI) was significantly higher than that

for the mouth opening test (0.22, 0.13–0.33; p < 0.001). For difficult tracheal intubation, the modified mallampati test had a significantly higher sensitivity (95%CI) at 0.51 (0.40–0.61) compared with mouth opening (0.27, 0.16–0.41; p < 0.001) and thyromental distance (0.24, 0.12–0.43; p < 0.001). Although the upper lip bite test showed the most favourable diagnostic test accuracy properties, none of the common bedside screening tests was well suited for detecting unanticipated difficult airways, as many of them were missed.[36]

A study was conducted by Bostan et al on five hundred patients to assess Nasal scale: a novel supplemental preoperative airway assessment technique. This study was done in Turkey Eastern black sea region, where a higher incidence of difficult intubation in humans with typical nose structure was observed. They compared the Nasal Scale scores ability to predict difficult intubation with available predictive test such as sternomental distance, thyromental distance and Mallampati classification. They concluded that Nasal Scale is objective and specific test that can be easily applied and can supplement the existing tests.[2] As we could not find any such study done in our subset of population with the use of nasal scale score as a predictor of difficult intubation, hence we propose to conduct an observational trial comparing Nasal scale score with Mallampati classification , sternomental distance and thyromental distance in terms of predicting difficult intubation as determined by Cormack-Lehane classification.

MATERIALS AND METHODS

SOURCE OF DATA

The study was conducted in double blind manner in the department of Anaesthesiology at Dayanand Medical College & Hospital, Ludhiana after approval by Institutional Ethics Committee. A written informed consent were taken from the patients. A total of 200 adult patients above the age of 18years scheduled for elective surgery under general endotracheal anesthesia were taken up for the study.

METHOD OF COLLECTION OF DATA

Inclusion Criterion

Patients older than 18 years of age scheduled for elective surgery under general anesthesia requiring endotracheal intubation.

Exclusion Criterion

Emergency and Obstetriccases In ability to give consent Edentulous patients Unstable cervical spine or suspected cervical trauma or omaxillofacial trauma, massive facial dressings. Mid lines wellings in neck Gross anatomical / congenital abnormalities of head and neck Patients with full stomach scheduled for emergency surgery or requiring rapid sequence induction. Patients with severe cardio respiratory distress a thorough Pre-anesthetice valuation comprising of detailed history and physical examination was conducted a day prior to surgery. A detailed airway assessment including dentition, mouth opening, Mallampati grading, thyromental distance, sternomental distance, neck circumference and Nasal scale score was done (described in appendix A) All the patients were kept fasting at least 8 hrs prior to surgery. All the study participants received Tabpantoprazole 40 mg at night and at 6:00 am in the morning on the day of surgery, tabalprazolam 0.25mgHS and at 6:00 am on the day of surgery with sip of water. Prior to induction of anaesthesia;

equipments, anaesthesia machine, required drugs, difficult intubation cart and all resuscitative measures were checked and kept ready. Patients were positioned supine on OT table in sniffing position by placing a 15 cm pillow under the occiput. Monitoring in the form of SpO2, HR, ECG, EtCo2 and NIBP were instituted and continued throughout the study period. After pre-oxygenation for 3 minutes in the supine position, patient were induced with intravenous injection propofol 2-3 mg/kg and neuromuscular block a de was achieved with intubating dose of intravenous injection of Atracurium 0.6mg/kg. After 3 minutes when complete airway relaxation was achieved, laryngoscopy was performed using Macintosh blade to visualize the larynx and the view was classified using the Modified Cormack Lehane classification. The anesthesiologists performing the laryngoscopy had an experience of atleast 3 years post MD and were blinded tonasal scale score of the patient. Intubation was done with an appropriate sized cuff edendotracheal tube. Confirmation of successful intubation was done by bilateral a us cultation over the lungfields and capnography. At the end of the study anaesthesia was maintained using the routine technique, followed by extubation and standard postoperative care.

Observations: Laryngoscopic grading of the best view possible with or without optimal external manipulation was noted according to the Modified Cormack and Lehanes classification (decribed in appendix B). Modified Cormack and Lehane grades 3 and 4 were graded as difficult laryngoscopy. Laryngoscopy and Endotracheal intubation was considered difficult if anyone of the following were

Positive:-

1. Modified Cormack and Lehane grade 2b, 3 and 4.
2. More than 3 attempts attracheal intubation.
3. If special maneuver / multiple blades / special instruments (intubating stillete) // alternative airway devices // multiple laryngoscopists was used to facilitate tracheal intubation.

OBSERVATIONS AND RESULTS

This study was conducted in the Department of Anaesthesiology Dayanand Medical College And Hospital, Ludhiana, on 200 adult patients admitted for various surgical procedure who required endotracheal intubation for general anaesthesia. The study aimed to evaluate the Predictive potential of Nasal Scale for Difficult Intubation and to compare the sensitivity and specificity of Nasal Scale with regard to Mallampati classification (MMP), Thyromental Distance (TMD) and sternomental distance (SMD). Various epidemiological factors were studied and various observations made during study as follows:

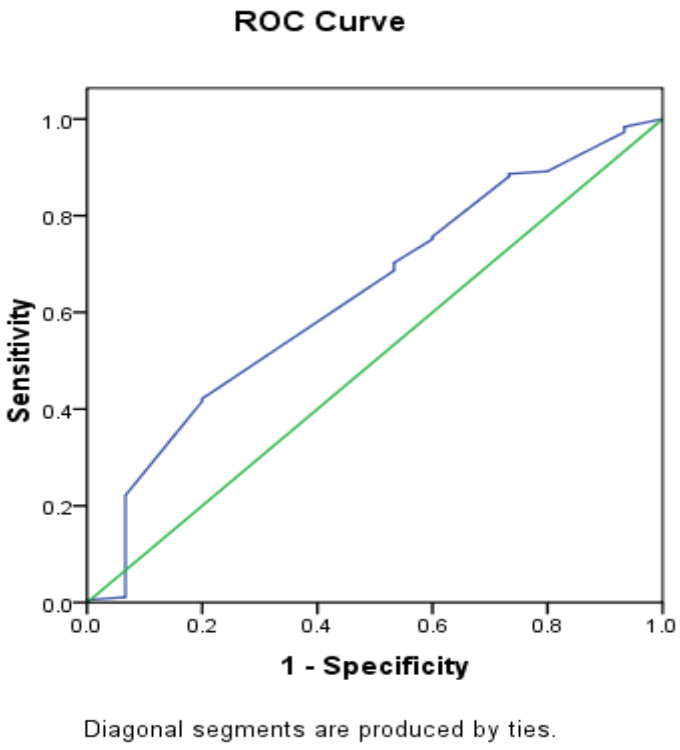

Fig. (3) Reciever Operating Characteristic Curve (Roc) For Thyromental Distance

Fig. (3) Roc curve for TMD showing area under curve (0.635) .Cut off value for sensitivity and specificity (0.422) and (0.800) respectively as per our study.

Table (1) Test Result Variable(s): Thyromental Distance (cm)

Area Under the Curve				
Area	Std. Error[a]	Asymptotic Sig.[b]	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
.635	.073	.082	.491	.779

Table (1) shows the relation of thyromental distance with difficulty in intubation. Thyromental distance of 7.25 cm was taken as cut-off. ROC curve for Thyromental distance shows area 0.635 and confidence interval (95%) lower bound 0.491 and upper bound 0.779. Results were (p-value 0.082) indicating thyromental distance as a poor predictor.

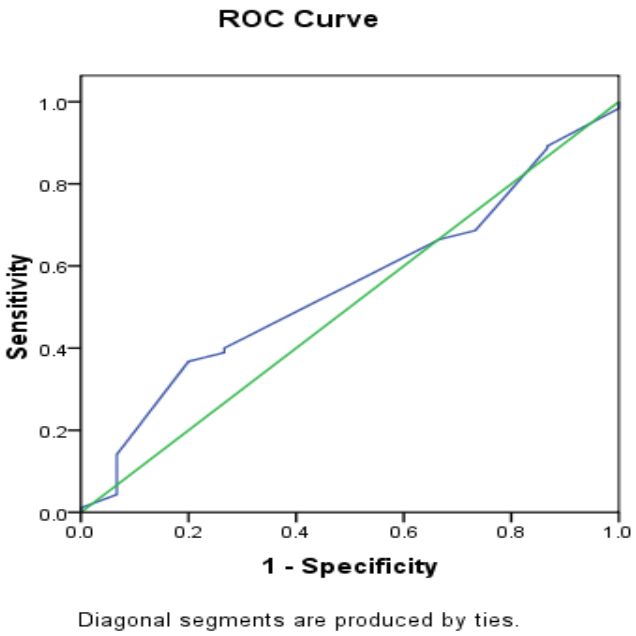

Fig. (4) Receiver Operating Characteristic Curve (Roc) For Sternomental Distance

fig.(4) Roc curve for SMD showing area under curve (0.549). Cut off value for sensitivity and specificity (0.368) and (0.800) respectively as per our study.

Table (2) Test Result Variable(s):Sternomental Distance (cm)

Area Under the Curve				
Area	Std. Error[a]	Asymptotic Sig.[b]	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
.549	.070	.530	.412	.685

Table shows the relation of Sternomental distance with difficulty in intubation. Sternomental Distance of 13.75 cm was taken as cut-off. ROC curve for sternomental distance shows area 0.549 and confidence interval (95%) lower bound 0.412 and upper bound 0.685. Results were insignificant (p-value0.530) indicating sternomental distance as a poor predictor.

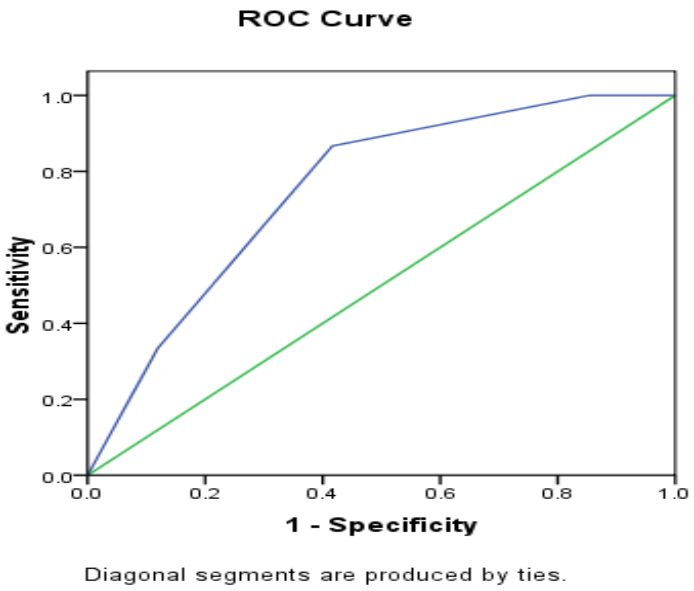

Fig. (5) Receiver Operating Characteristic Curve (Roc) For Mallampati Classification

Fig. (5) Roc curve for MMP showing area under curve (.753).Cut off value for sensitivity and specificity (0.416) and (0.584) respectively as per our study.

Table (3) Test Result Variable(s): Mallampati Classification

Area Under the Curve				
Area	Std. Error[a]	Asymptotic Sig.[b]	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
.753	.055	.001	.645	.861

Table (3) shows the relation of Mallampati score with difficulty in intubation. MMP III and IV were taken as cut off ROC curve for Mallampati classification shows area 0.753 and confidence interval (95%) - lower bound 0.645 and upper bound 0.861. Results were significant (p-value .001) indicating that MMP is a good predictor.

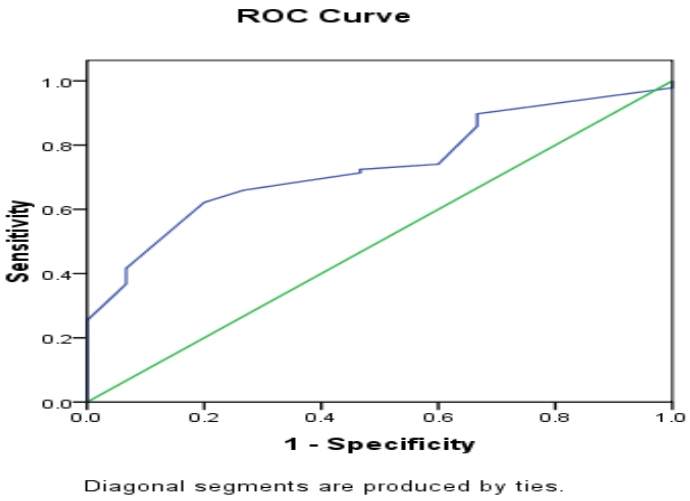

Fig. (6) Reciever Operating Characteristic Curve (ROC) For Nasal scale

Fig (6) Roc curve for NS showing area under curve (0.734). Cut off value for sensitivity and specificity (0.622) and (0.800) respectively as per our study.

Table (4) Test Result Variable(s): Nasal Scale

Area Under the Curve				
Area	Std. Error[a]	Asymptotic Sig.[b]	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
.734	.053	.003	.630	.837

Table 4 shows the relation of Nasal scale with difficulty in intubation. NS of 1.23 was taken as cut off. ROC curve for Nasal scale shows area 0.734 and confidence interval (95%) – lower bound0.630 and upper bound 0.837.Highly significant p value (.003) indicated that Nasal scale has important influence on Difficulty in intubation.

Table (5) For Thyromental Distance

		CLC GROUP				Total		Kappa value	p-value
		Difficult		Non Difficult					
TMD GROUP	Difficult (<6.5)	6	40.0%	45	24.3%	51	25.5%	0.075	0.180
	Non Difficult	9	60.0%	140	75.7%	149	74.5%		
Total		15	7.5%	185	92.5%	200	100.0%		

Table (5) shows the relation of thyromental distance with difficulty in intubation. Thyromental distance of 7.25 cm was taken as cut-off. ROC curve for Thyromental distance shows area 0.635 and confidence interval (95%)- lower bound 0.491 and upper bound 0.779. Results were Insignificant (p-value 0.082) indicating thyromental distance as a poor predictor.

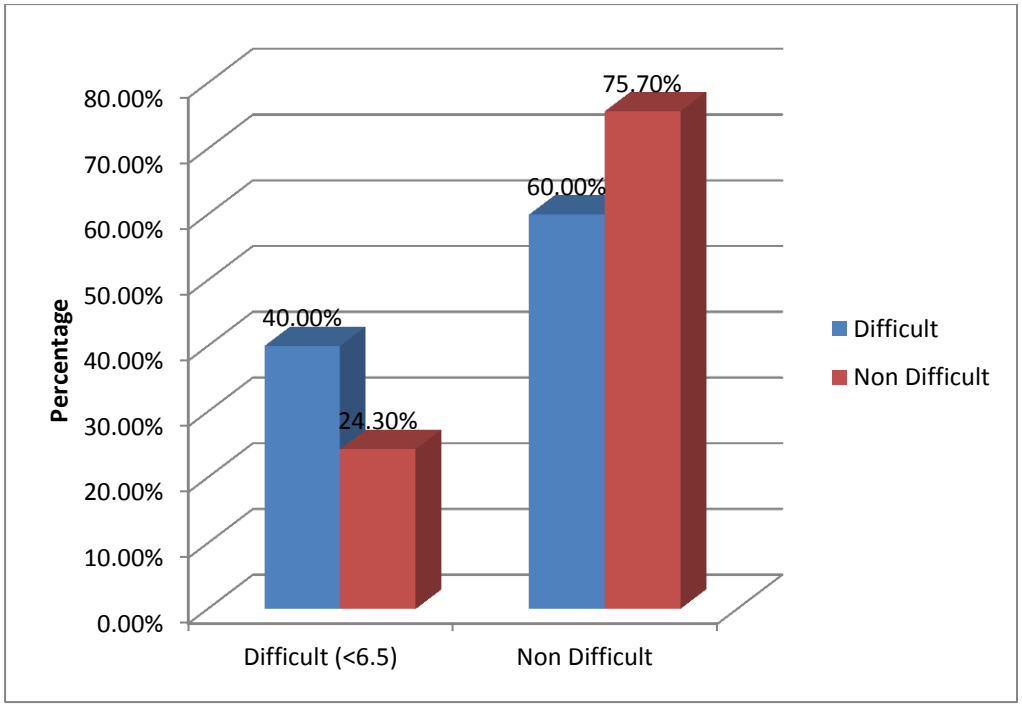

Fig. (7) True Positive Value & False Positive Value for TMD as per CL Grade

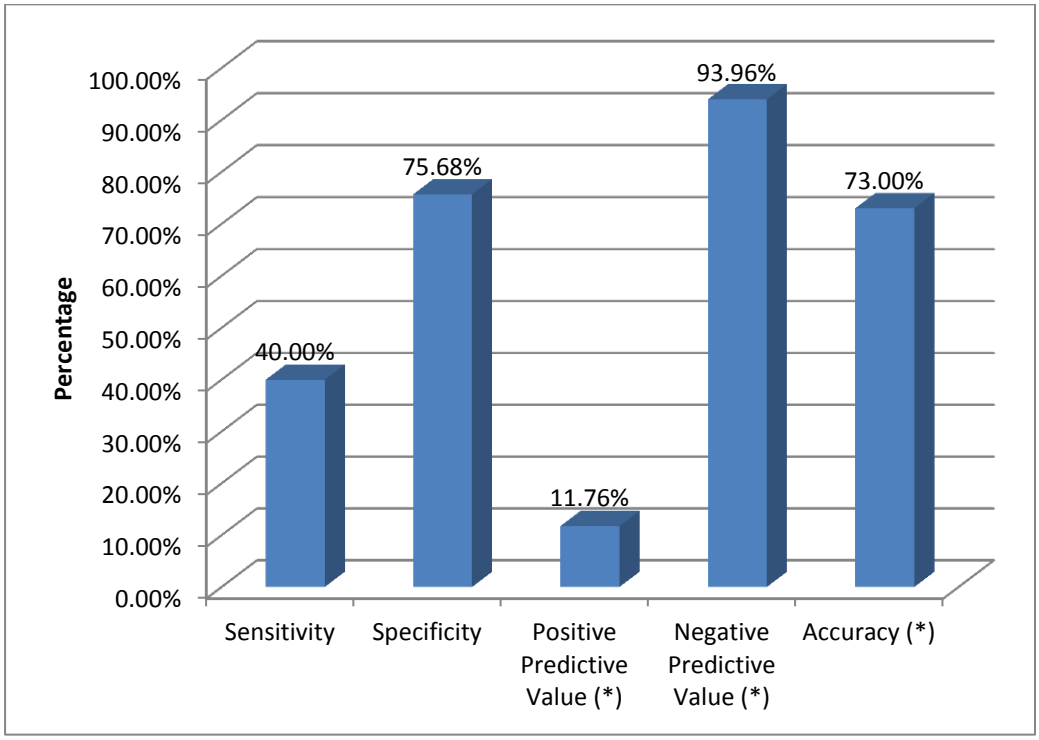

Fig. (8) Sensitivity, Specificity & Accuracy of TMD

Table (6) For Sternomental Distance

		CLC GROUP				Total		Kappa value	p-value
		Difficult		Non Difficult					
SMD GROUP	Difficult (<12.5)	5	33.3%	62	33.5%	67	33.5%	-0.001	.989
	Non Difficult	10	66.7%	123	66.5%	133	66.5%		
Total		15	7.5%	185	92.5%	200	100.0 %		

Table (6) shows the relation of Sternomental distance with difficulty in intubation. Sternomental Distance of 13.75 cm was taken as cut-off. ROC curve for sternomental distance shows area 0.549 and confidence interval (95%)-lower bound 0.412 and upper bound 0.685. Results were insignificant (p- value0.530) indicating sternomental distance as a poor predictor.

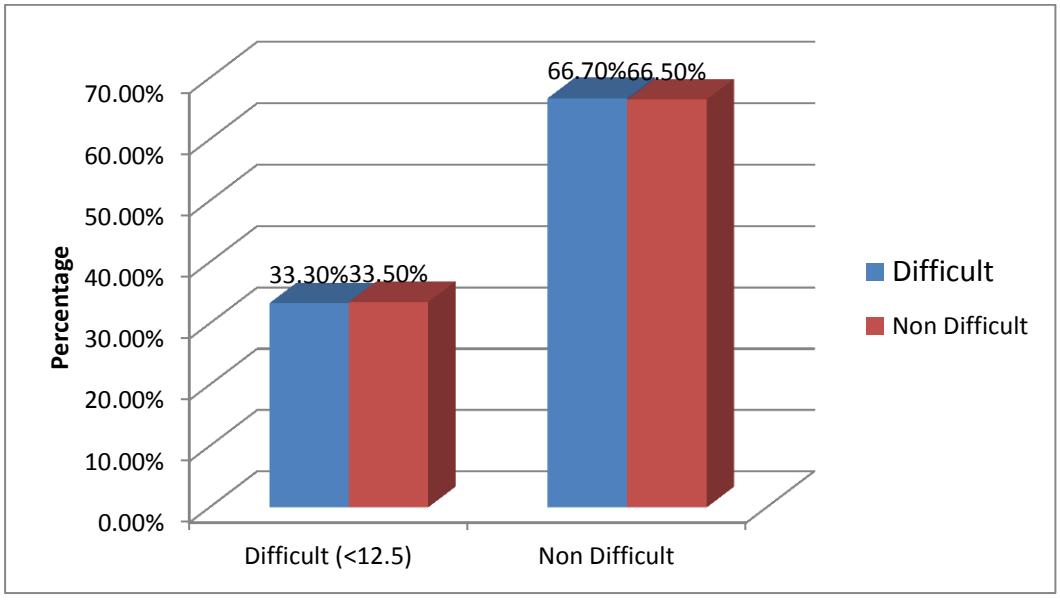

Fig. (9) True Positive Value & False Positive Value For SMD As Per CL Grade

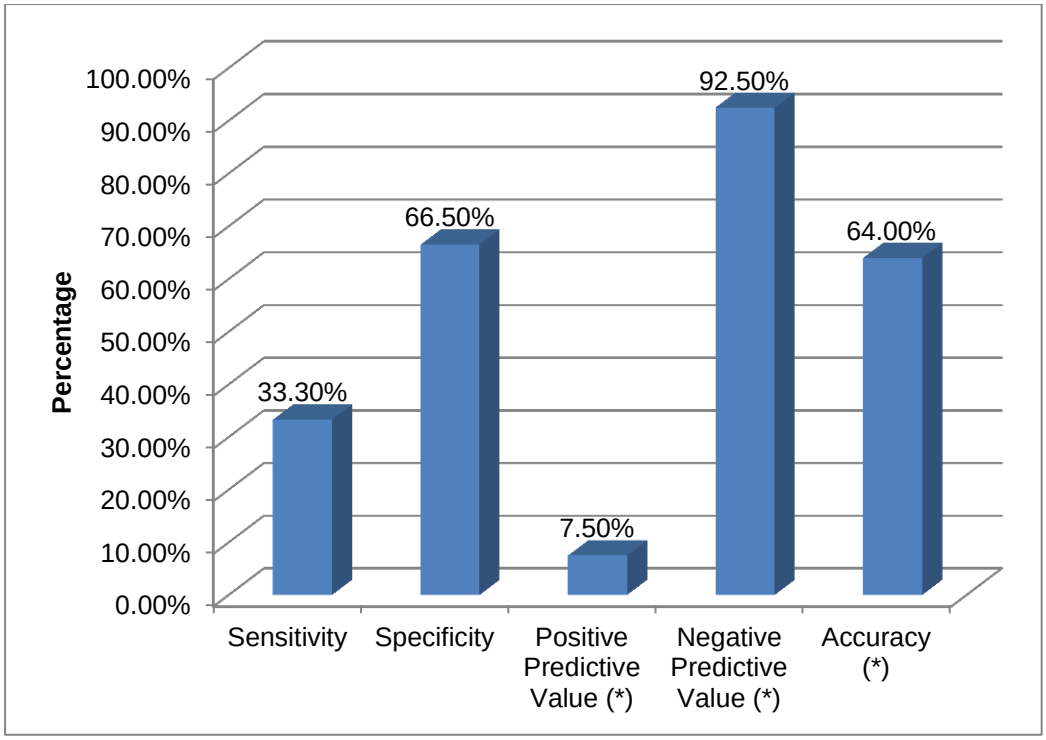

Fig. (10) Sensitivity, Specificity & Accuracy Of SMD

Table (7) For Mallampati Classification

		CLC GROUP				Total		Kappa value	p-value
		Difficult		Non Difficult					
MMP GROUP	Difficult (III-IV)	13	86.7%	77	41.6%	90	45.0%	0.137	0.001
	Non Difficult	2	13.3%	108	58.4%	110	55.0%		
Total		15	7.5%	185	92.5%	200	100.0%		

Table (7) shows the relation of Mallampati score with difficulty in intubation. MMP III and IV were taken as cut off ROC curve for Mallampati classification shows area 0.753 and confidence interval (95%) -lower bound 0.645 and upper bound 0.861. Results were significant (p-value .001) indicating that MMP is a good predictor.

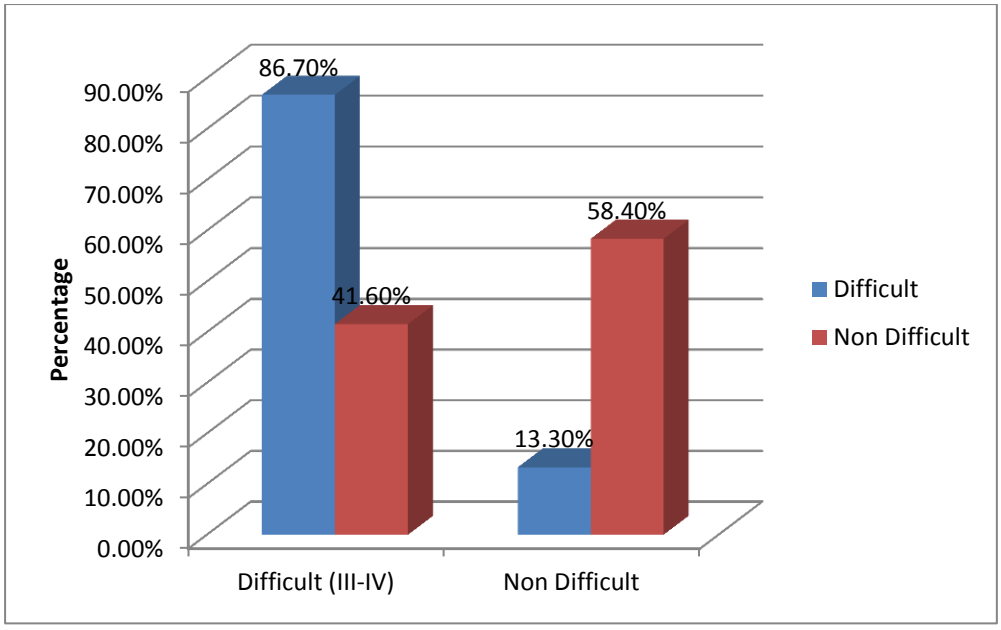

Fig. (11) True Positive Value & False Positive Value For Mallampati Classification As Per CL Grade

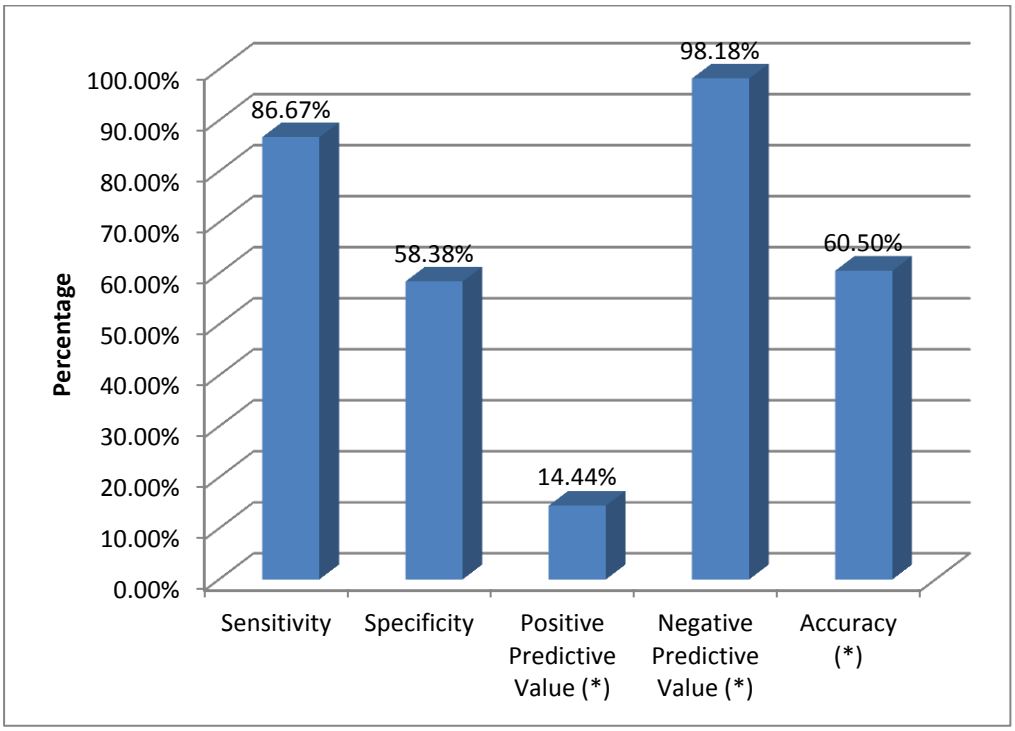

Fig. (12) Sensitivity, Specificity & Accuracy Of Mallampati Classification

Table (8) For Nasal Scale

		CLC GROUP		Total	Kappa value	p-value
		Difficult	Non Difficult			
NS GROUP	Difficult (<1.4)	12	70	82(41%)	0.138	0.001
	Non Difficult	3	115	118(59%)		
Total		15	185	200		

Table 8 shows the relation of Nasal scale with difficulty in intubation. NS of 1.23 was taken as cut off. ROC curve for Nasal scale shows area 0.734 and confidence interval (95%) – lower bound0.630 and upper bound 0.837.Highly significant p value (.003) indicated that Nasal scale has important influence on Difficulty in intubation

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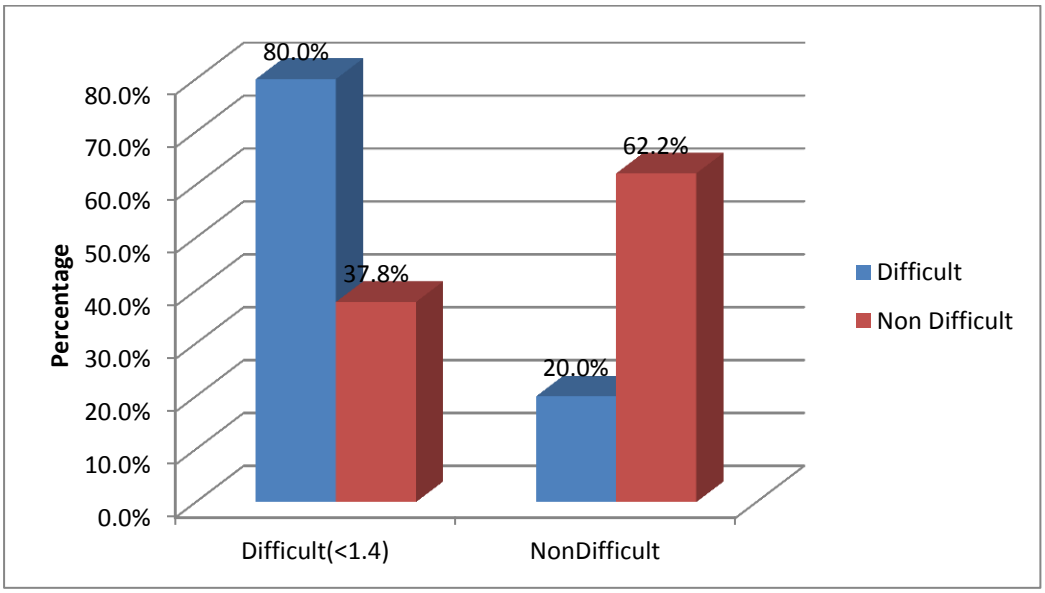

Fig. (13) True Positive Value & False Positive Value for Nasal Scale as per CL Grade

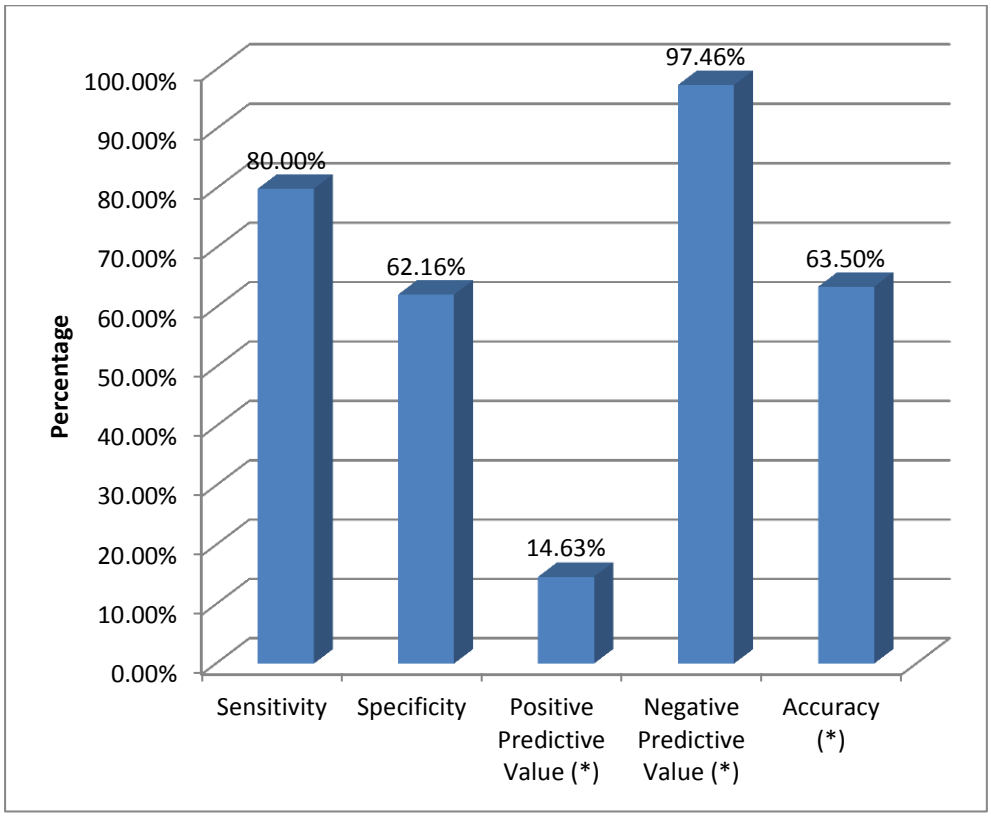

Fig (14) Sensitivity, Specificity & Accuracy of Nasal Scale

The frequency of difficult intubation was found to be 7.5% by CL. Prediction of difficult Intubation by MMP was 45%, NS was 41%, SMD was 33.5 and TMD was 25.5%. Prediction with NS and MMP were similar compared to CL. TMD shows greater variations in terms of difficult Intubation predictions compared with CL.

DISCUSSION

Airway assessment is an important skill for an anesthesiologist.[37] A thorough general physical examination and airway examination might help in predicting difficult intubations and also help to reduce the incidence of catastrophic complications such as hypoxia, hypercarbia, direct airway trauma, brain damage and myocardial cell damage.[2,38] Several non invasive clinical preoperative airway indices have been described by various authors to avoid unanticipated difficult airway situation. In the year 1980's, Dr. Vijayalakshmi Patil suggested the measurement of anatomical structures present in head and neck.[23] During the same period Sesha Giri Rao Mallampatti developed a hypothesis for prediction of difficult airway.[35] Various other predictors have been developed since then like inter incisor gap, sternomental distance etc. which were used as single test. Modified Mallampatti classification (MMP), Thyromental distance (TMD), Sternomental distance (SMD), mouth opening, protrusion of the mandible, position and size of teeth, stability and elasticity of the atlanto-occipital joint are still used to evaluate the airway during the preoperative visit.[2]

We studied 200 patients in a double blinded manner to evaluate the predictive potential of Nasal Scale for difficult Intubation and to compare the sensitivity and specificity of Nasal Scale with regard to Mallampati classification, Thyromental distance and Sternomental distance. Difficult airway represents a complex interaction between patient factors, clinical setting and the skills of the anesthesiologist. [35] As per the American Society Anesthesiologists Task Force difficult airway is defined as the clinical situation in which a conventionally trained anesthesiologist experiences difficulty with face mask ventilation of the airway, difficulty with tracheal intubation or both.[39] We used the following end points to define difficult intubation : Modified Cormack Lehane grade III and IV, more than 3 attempts at tracheal intubation by trained anesthesiologist , any special maneuvers,

multiple blades, special instrument like stylet, alternate airway device were used to facilitate tracheal intubation.

In our study, incidence of difficult intubation was found to be 7.5% by CL grade III and IV. Our findings are similar to those of Cohen et al who reported incidence of difficult intubation 7.22% [9] by CL grade but in contrast to our study the incidence of difficult intubation was higher [12.4%] by Bostan et al study.[2] In our study, the sensitivity of MMP was highest [86.7%] followed by Nasal scale, SMD and TMD. Thus making MMP and NS as better predictors of difficult laryngoscopy with highest sensitivity 86.7% and 80% , accuracy 60% and 63.5% and area under curve [AUC] of 75.3% and 73.4%, respectively in our study population. We tried to eliminate the inter observer bias by keeping single observer for preoperative assessment in all subjects and getting the laryngoscopy done by trained anesthesiologist having atleast 3 years of experience.

The parameters which were considered for prediction of difficult intubation in our study were age, sex, gender, height, weight, BMI, dentition, neck circumference, mouth opening, temporomandibular joint mobility, TMD, SMD, neck movement and MMP. All the predictive tests used in our study could be easily performed at the bedside of the patient. The purpose behind using bed side airway assessment tests was to avoid the use of cumbersome equipments and procedures in order to have day to day applicability of the tests.

Riad et al in their study showed that a high BMI is an independent predictor for difficult intubation, and they reported that a BMI higher than 50 kg/m^2 increased the risk of difficult intubation five times.[36] In a meta-analysis by Shiga et al the risk of difficult intubation was three times higher in morbidly obese patients than in normal-weight patients.[33] In contrast, Neligan et al and Brodsky et al did not find a relationship between morbid obesity and difficult intubation.[40,41] We reported a higher sensitivity [80%] and PPV of 11.32% for BMI > 25

kg/m^2. As per Asian Classification of BMI, Class 1- obese patient starts from BMI > 25 kg/m^2. Hence in our study also, higher BMI was associated with increased risk of difficult intubation.

We found that the sensitivity, specificity, positive predictive value and negative predictive value of mouth opening more than 5 cm was 13%, 93%, 14.129% and 93.01%, respectively. The low sensitivity can be attributed to less number of patients with restricted mouth opening in our study. The criteria inter incisor gap, is one of the essential components of temporomandibular joint integrity. Rose DK and colleagues also reported that a reduced inter incisor gap, decreased neck mobility, decreased thyromental distance and the combination of these factors better predict difficult endotracheal intubation. As the individual parameters have low accuracy, to improve positive predictive value, a combination of predictive variables can be used to build a model so as to predict patients with difficult intubation pre-operatively with greater accuracy.[10]

The receiver operating characteristic [ROC] curve represents the graphical relationship between sensitivity and specificity.[42] ROC analysis includes four bedside airway assessment tests: thyromental distance, sternomental distance, Mallampati test and nasal scale. Its validation was done by doing sensitivity and specificity analysis on the study population using this model. [24] In ROC analysis the advantage is that the area below the ROC curve is independent. A study is ideal when the ROC area is equal to 1.0, inaccurate when it is less than 0.5, low accuracy if the ROC area is between 0.5 and 0.7, and becomes accurate with an area equal to 0.7.[42] The ROC areas were 0.753 for MMP, 0.734 for NS, 0.635 for TMD and 0.549 for SMD in our study.

TMD has been the most important of all the bedside tests.[43] Thyromental distance is considered important because it indicates the submandibular space. This submandibular space lodges the tongue that is displaced by the laryngoscope blade and it is influenced by head

extension. Several studies have used various cut off points for thyromental distance demonstrating various results. Shiga T et al conducted a meta-analysis, for evaluating bed side test for predicting the difficulty in intubation among patients. In this meta analysis thirty-five studies, including 50,760 subjects, were taken and they found that the diagnostic value of TMD was unsatisfactory due to wide range in sensitivity, which may be due to different cut off points [4–7 cm] of TMD.[33] Honarmand et al reported a TMD of <7.1 cm as a cut-off value for a difficult intubation. In our study the sensitivity, specificity, positive predictive value and negative predictive value of thyromental distance was 40%,99.4%,11.76% and 95.97%, respectively. We did not consider a TMD of <6.5 cm as a predictor for difficult endotracheal intubations due to less sensitivity and less specificity in our study. Differences in TMD-related findings could be explained by factors that might influence the measurement of TMD, including limitation of head extension, shortness and depth of the mandible, and the height of the larynx. As a result, some authors have doubted the reliability of TMD as an isolated predictive test for difficult laryngoscopies and intubations. As the individual parameters have low accuracy, to improve positive predictive value a combination of predictive variables like MMP, Nasal scale and SMD can be used to predict difficult intubation pre-operatively with greater accuracy.

In our study the sensitivity, specificity, and positive predictive value for SMD with reference cut off < 12.5cm was 40%, 75.68% and 11.76% respectively. Low sensitivity and low PPV [AUC 0.549] of SMD indicates that it is a poor predictor according to our study but results are contradictory to a study by Savva in which SMD of <12.5 cm was found to be the best predictor of DL and suggested that SMD should be used as the sole routine test.[8] Ramadhani et al, assessed the value of SMD as a sole predictor of DL in an obstetric population. [22] They found a significant difference between SMD in patients with a CL Grade 3 or 4 laryngoscopic view compared with those with a Grade 1 or 2 view. There is a wide range of SMD cut-off values such as 12.5 cm,13.5 cm

and 15 cm to predict DL in the literature. This could be due to anthropometric differences in various ethnic population groups. Due to various discrepancies in the SMD cut off values in various studies it was found that SMD as single predictor for difficult intubation is not very precise and reliable, therefore inclusion of other parameters like MMP, Nasal scale and TMD etc are required for better results. The modified Mallampati classification is a widely accepted, popular morphologic test to predict a potentially difficult airway. [35] Carvalhoa et al conducted a study on 36 patients in which the class II MMP cutoff had the highest odds ratio and also had a much higher sensitivity (94.44%). For the cut-off of class II, MMP appears to be more clinically effective according to their study. MMP was initially intended to be performed while seated with the head in a neutral position, the mouth wide open, and the maximum tongue protrusion. Ittichaikulthol et al found the modified Mallampati test alone to have low sensitivity and specificity as a predictor of difficult intubation, but they reported that the combined use of thyromental distance and modified Mallampati test yielded significant results.[44] A score of III–IV in Mallampati classification in obese patients is a predictor of difficult intubation.[45, 46] In our study, MMP came as an independent risk factor for difficult intubation as its sensitivity and specificity was (86.7%) and (58.4%) respectively, when MMP class III and IV were taken as cut off suggesting MMP as a good predictor of difficult Intubation. Due to discomfort, hemodynamic instability, and cervical spine injuries, it may not be possible or prudent to assess the airway of the patients while they are in sitting position. [44] The MMP classification is also prone to error with phonation which occurs involuntarily resulting in poor differentiation between its various grades.

To overcome these challenges, we chose to study a new parameter nasal scale as a predictor of difficult intubation. Nasal scale is a quick and easy to perform bed side test done with the help of measuring tape.[2] The instructions required for both the observer and patient are extremely easy. Thus there is less probability of misinterpretation while

performing this test.

Nasal Scale has high sensitivity 80% in our set of population in comparison to study by Bostan et al who reported worst sensitivity 30.6% of Nasal scale in their population. Also we reported specificity of 62.16% with accuracy of 63.5% as compared to their study, which reported higher specificity 93.6%. The reason for this could be that the cut off value for ROC curve analysis was 1.4 in Bostan et al study and in our study it was 1.2. Also the number of patients in our study was less i.e. 200 whereas they included 500 patients in their study population. There is difference in anatomic structure of nose in Northern region of Indian population. Nikhil et al conducted a descriptive cross-sectional epidemiological study with 1,000 volunteers, to identify differences in nasal morphology in the Indian population and amongst its various regions, with an equal number of subjects drawn from five geographic groups: the North, Central, West, South, and Himalayan region. They reported that the nose of north Indians was longer and narrower compared to the rest of study population.[47] We thus conclude that Indian nose should be considered a different entity in comparison to Caucasians, Orientals and African population. There are obvious differences in the facial architecture of people from different regions within our country. Hence we reported a high sensitivity of Nasal scale in our population group. Higher sensitivity indicated that these patients will have truly difficult intubation. So they should be subjected to the protocol of difficult airway management. The incidence of prediction of difficult intubation by MMP was 45%, NS was 41%, SMD was 33% and TMD was 25.5% in our study. On univariate analysis, we found that Mallampati score had highest overall sensitivity as compared to nasal scale, thyromental distance and sternomental distance. No single airway test can provide best sensitive and specific index for prediction of difficult airway. Nasal scale can be used in combination with other methods as new assessment test for difficult intubation. Nasal scale could be an indicator for difficult tracheal intubation. Nasal scale may have a role in physically and mentally

disabled patients, as well as in those who do not cooperate or are unable to open their mouth for other tests such as the modified Mallampati score. Additionally, nasal scale variance due to race and location will be present. The limitation of our study was that it was done in a limited set of population and a greater number of populations are required to predict the difficulty in intubation. We recommend using the Nasal scale with other predictors in routine clinical practice.

SUMMARY AND CONCLUSION

The present study was conducted in a double blinded manner to evaluate the predictive potential of Nasal Scale for difficult Intubation and to compare the sensitivity and specificity of Nasal Scale with regard to Mallampati classification, Thyromental distance and sternomental distance at Dayanand Medical College and Hospital, Ludhiana after approval by Institutional Ethics committee (IEC) and written informed consent by the patients.

A total of 200 adult patients above the age of 18 years scheduled for elective surgery under general endotracheal anesthesia were taken up for the study.

A thorough pre-anesthetic evaluation comprising of detailed history and physical examination was conducted a day prior to surgey. Airway assessment including dentition, mouth opening, Mallampati grading, thyromental distance, sternomental distance, neck circumference and nasal scale score was done a day prior to the surgery.

All the patients were kept fasting at least 8 hrs prior to surgery. Prior to induction of Anaesthesia; equipments, anaesthesia machine, required drugs, difficult intubation cart and all resuscitative measures were checked and kept ready. Patient was positioned supine on OT table and after pre-oxygenation for 3 minutes in the supine position when complete airway relaxation was achieved, laryngoscopy was performed using Macintosh blade to visualize the larynx and the view was classified using the Modified Cormack Lehane classification.

All the results were tabulated and analysed by using chi square z test, sensitivity and specificity analysis. It was concluded that the incidence of difficult intubation in our study population was 7.5% when CL grade III and IV was used. The sensitivity for MMP was highest 86.7% and NS was 80%.ROC plotted for sensitivities and specificities of various

test used in assessment in airway. AUC for Nasal scale was 0.734, thus validating the model.

Conclusion

In our study sensitivity of MMP was higher but accuracy, specificity; PPV and NPV were less than NS which means NS is a good predictor after MMP. Nasal scale is a quick and easy to perform bed side test done with the help of measuring tape. No single airway test can provide best sensitive and specific index for prediction of difficult airway. Nasal scale can be used in combination with other methods as new assessment test for difficult intubation. Nasal scale has an important role in physically and mentally disabled patients, as well as in those who do not cooperate or are unable to open their mouth for other tests such as the modified Mallampati score, Thyromental distance and Sternomental distance. We recommend using the Nasal scale with other predictors in routine clinical practice.

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S.NO	NAME	MRD	AGE (in Yrs)	GENDER	RELIGION	HEIGHT (INCHES)	HEIGHT (CM)	WEIGHT(KG)	BMI	SURGERY	AIR WAY DENTITION	AIR WAY NECK MOVEMENT	AIR WAY Neck circumference (cm)	AIR WAY TMJ MOBILITY
1	AS	846144	48	M	Sikh	5.7	173.7	80	26.50	Lap Chole	Present	Adequate	40	Adequate
2	DS	1241673	53	F	Hindu	5.3	161.5	71	27.21	Lap Chole	Present	Adequate	39	Adequate
3	AK	1139509	20	M	Hindu	5.5	167.6	57	20.28	Ant. Reaction of ca Ractum	Present	Adequate	39	Adequate
4	LDB	1028568	53	F	Hindu	5.6	170.7	68	23.34	Lap cholecystectomy	Present	Adequate	40	Unrestricted
5	S	1142148	56	F	Hindu	5.4	164.6	65	23.99	Retroperitoneal Paraganglioma	Present	Adequate	36	Adequate
6	SR	1071130	86	M	Sikh	5.5	167.6	70	24.91	Lap & Proceed	Present	Adequate	32	Adequate
7	R	520367	27	F	Sikh	5.2	158.5	40	15.92	Tympanoplastry	Present	Adequate	32	Adequate
8	S	214197	44	F	Hindu	5.2	158.5	64	25.48	Hemi thyroid ectomy	Present	Adequate	34	Adequate
9	CS	1140084	52	M	Sikh	5.9	179.8	81	25.05	Zygema #ORIF	Present	Adequate	38	Unrestricted
10	S	1138061	53	F	Hindu	5.3	161.5	88	33.72	Lap Chole	Present	Adequate	38	Adequate
11	A	1150854	21	F	Sikh	5.4	164.6	60	22.15	Stapedotomy	Present	Adequate	34	Adequate
12	NS	773061	33	M	Hindu	5.7	173.7	61	20.21	Endo DCR	Present	Adequate	30	Adequate
13	A	1069870	81	F	Sikh	5.3	161.5	40	15.33	Lap Hiatus Hernie Repair	Absent	Limited Extension	40	Limited
14	RC	1001497	25	M	Rajput (Hindu)	5.6	170.7	60	20.59	Gastrojejinostomy	Present	Adequate	40	Unrestricted
15	FS	1071202	54	M	Muslim	5.4	164.6	60	22.15	Tympanoplasty for CSOM	Present	Adequate	40	Normal
16	M	1068552	62	F	Hindu	5.2	158.5	80	31.85	Lap Appendectory	Present	Adequate	42	Adequate
17	C	1036545	60	M	Hindu	5.9	179.8	78	24.12	High injuirial or chidectomy	Missing Some	Adequate	40	Adequate
18	A	1134298	54	F	Hindu	5.2	158.5	80	31.85	Epom plus obstructed unit Hernia	Absent	Short neck+Adequate	43	Unrestricted
19	SK	680684	55	F	Sikh	5.3	161.5	66	25.29	FESS	Absent	Adequate	36	Adequate
20	CS	1140084	52	M	Sikh	5.9	179.8	81	25.05	ORIF Zygema	Present	Adequate	34	Unrestricted
21	V	1201546	48	F	Hindu	5.2	158.5	80	31.85	TME	Present	Adequate	44	Adequate
22	LS	1183489	21	M	Sikh	6	182.9	80	23.92	Septoplasty+chino	Present	Adequate	40	Adequate
23	Ts	1185048	38	M	Sikh	5.8	176.8	70	22.40	TME	Present	Adequate	43	Adequate
24	S	1201922	33	F	Hindu	5.3	161.5	75	28.74	TLH	Present	Adequate	37	Adequate
25	GK	996131	62	F	Sikh	5.2	158.5	94	37.42	Lap Chole	Present	Restricted	48	Restricted
26	RV	988356	47	M	Hindu	5.1	155.4	72	29.80	Lap cholecyst	Present	Adequate	40	Adequate
27	AK	1199618	38	F	Sikh	5.6	170.7	88	30.20	VATS	Present	Adequate	36	Adequate
28	KP	314847	29	M	Hindu	6.5	198.1	65	16.56	DNS	Present	Adequate	38	Adequate
29	V	307097	29	M	Hindu	6	182.9	60	17.94	MLS	Present	Adequate	38	Adequate
30	NK	1026460	26	F	Hindu	5	152.4	74	31.86	Lap chole	Present	Adequate	40	Adequate
31	RG	597191	23	M	Hindu	5.9	179.8	70	21.65	Septo Turbinoplaty	Present	Adequate	40	Adequate
32	SD	5496	39	F	Hindu	5.1	155.4	65	26.90	Lap chole	Present	Adequate	40	Adequate
33	BK	985359	65	F	Sikh	5.4	164.6	58	21.41	Stomia Closure	Missing Some	Adequate	37	Adequate
34	PL	657883	60	M	Hindu	5.3	161.5	74	28.36	Lap chole	Present	Adequate	40	Adequate
35	S	366102	60	F	Hindu	5.6	170.7	49	16.82	Hemithyroidectomy	Present	Adequate	33	Adequate
36	SS	680101	64	M	Sikh	5.9	179.8	78	24.12	Inguinal hemie Repair + Lap chole	Missing Some	Adequate	40	Adequate
37	MP	1115050	59	F	Hindu	5.2	158.5	75	29.86	Endoscopic Exploration	Present	Adequate	40	Adequate
38	RA	1119787	66	F	Hindu	5.7	173.7	79	26.17	Lap chole	Present	Adequate	38	Adequate
39	GS	1113996	61	M	Sikh	5.9	179.8	84	25.97	Endoscopic Defri	Present	Adequate	37	Adequate
40	RK	70817	53	M	Hindu	5.2	158.5	80	31.85	Lap chole	Present	Adequate	40	Adequate
41	M	1195322	41	F	Hindu	5	152.4	30	12.92	Diversion ileostory	Present	Adequate	30	Adequate
42	S	1200385	48	F	Hindu	5	152.4	75	32.29	Lap Resection	Present	Adequate	38	Adequate
43	MR	1188770	85	M	Hindu	5.1	155.4	76	31.45	Burr Hole. Chr. SDH B/C	Absent	Adequate	40	Adequate
44	A	997856	67	F	Hindu	5.3	161.5	57	21.84	Lap. Assisted Vaginal Hyterotomy	Missing Some	Adequate	40	Unrestricted
45	A	996674	17	F	Hindu	5.4	164.6	52	19.19	Spleenectomy for splenic cyst	Present	Adequate	40	Adequate
46	SK	996933	50	F	Hindu	5.3	161.5	75	28.74	FESS	Present	Adequate	38	Adequate
47	D	992871	34	F	Hindu	5.2	158.5	56	22.29	Total thyroidectomy	Present	Adequate	40	Adequate
48	R	192576	27	M	Hindu	5.5	167.6	60	21.35	Skin graftomy	Present	Adequate	40	Adequate
49	RK	1203318	48	F	Sikh	5.7	173.7	71	23.52	Exp Lap & proceed	Present	Adequate	40	Unrestricted
50	AS	1118485	27	M	Sikh	5.7	173.7	80	26.50	Lap Varico cale	Present	Adequate	40	Adequate
51	SS	1120085	57	M	Sikh	5.7	173.7	65	21.53	Lap Appendectory	Present	Adequate	35	Adequate
52	LA	1035875	30	M	Hindu	5.5	167.6	67	23.84	ETEP Bill vreteric stenting	Present	Adequate	40	Adequate
53	SS	791813	46	M	Hindu	5.7	173.7	65	21.53	Lap Cholecystectomy	Present	Adequate	38	Unrestricted
54	M	1140392	43	F	Hindu	5.5	167.6	82	29.18	TLH	Present	Adequate	36	Adequate
55	AKS	1089611	43	M	Hindu	5.7	173.7	88	29.15	ETEP B/L Inguine Hernie	Present	Adequate	43	Adequate
56	LS	1137562	62	M	Hindu	5.3	161.5	78	29.89	DL Scopic Biopsy	Present	Adequate	43	Adequate
57	M	255795	37	F	Hindu	5.5	167.6	54	19.21	LNode Biopsy	Present	Adequate	35	Adequate

S.NO	NAME	MRD	Thyromental distance (cm)	mouth opening	Sternomental distance (cm)	Mallampati classification	Nasal Scale LENGTH	Nasal Scale WIDTH	Nasal Scale RATIO	Cormack Lehane Classification GRADE	CL GROUP	Attempts of tracheal intubation	change of laryngoscopic blade yes/no	use of stillete yes/no	Alternative devices Yes/No
1	AS	846144	10	>3FB	16	2	6	5.5	1.09	2B	1	1	No	Yes	No
2	DS	1241673	8	>3FB	12.5	2	5	4.5	1.11	2B	1	1	No	Yes	No
3	AK	1139509	9	>3FB	12	2	4.5	5	0.90	1	2	1	No	Yes	No
4	LDB	1028568	10	>3FB	15	2	5	6.5	0.77	2A	2	1	No	Yes	No
5	S	1142148	7	>3FB	14	4	5	4.5	1.11	2B	1	1	No	Yes	No
6	SR	1071130	7	>3FB	12	1	6	5	1.20	2A	2	1	No	Yes	No
7	R	520367	9	>3FB	14	3	5	4.5	1.11	2A	2	1	No	Yes	No
8	S	214197	6.5	>3FB	14	1	5	4	1.25	2A	2	1	No	Yes	No
9	CS	1140084	6.5	>3FB	13	3	5	4	1.25	3B	1	2	No	Yes	No
10	S	1138061	5.8	>3FB	12.5	2	5	4.5	1.11	2A	2	1	No	Yes	No
11	A	1150854	7	>3FB	13	1	5	4.5	1.11	2B	1	1	No	Yes	No
12	NS	773061	6.8	>3FB	13.2	2	6	5	1.20	2A	2	1	No	Yes	No
13	A	1069870	6.2	>3FB	12	4	5	5	1.00	2B	1	1	No	Yes	No
14	RC	1001497	7	>3FB	15	1	5	5	1.00	1	2	1	No	Yes	No
15	FS	1071202	7	>3FB	13.5	3	5	5	1.00	3A	1	3	No	Yes	No
16	M	1068552	6.5	>3FB	13	3	6	4	1.50	2A	2	1	No	Yes	No
17	C	1036545	7	>3FB	14	3	6.5	5	1.30	2B	1	1	No	Yes	No
18	A	1134298	6	>3FB	11	3	5	5	1.00	3A	1	1	No	Yes	No
19	SK	680684	6	>3FB	11	3	5	4.5	1.11	2A	2	1	No	Yes	No
20	CS	1140084	6.8	>3FB	13	3	5	5	1.00	3A	1	1	No	Yes	No
21	V	1201546	9	>3FB	15	3	5.5	4	1.38	2A	2	1	No	Yes	No
22	LS	1183489	8	>3FB	14	2	6	5	1.20	2A	2	1	No	Yes	No
23	Ts	1185048	9	>3FB	16	1	6	5	1.20	2A	2	1	No	Yes	No
24	S	1201922	6.5	>3FB	13	3	5.5	4	1.38	2A	2	1	No	Yes	No
25	GK	996131	5	>3FB	10	3	5.5	4.5	1.22	2B	1	1	No	Yes	No
26	RV	988356	10	>3FB	17	2	6	4	1.50	2B	1	1	No	Yes	No
27	AK	1199618	7	>3FB	13	2	6	4	1.50	2A	2	1	No	No	No
28	KP	314847	6.5	>3FB	12	2	5	4.5	1.11	2B	1	1	No	Yes	No
29	V	307097	8	>3FB	15	2	6	4.5	1.33	2A	2	1	No	Yes	No
30	NK	1026460	8	>3FB	15	4	5	3	1.67	2A	2	1	No	Yes	No
31	RG	597191	7	>3FB	11	2	6	4	1.50	2A	2	1	No	Yes	No
32	SD	5496	8	>3FB	15	2	4.5	4.5	1.00	2B	1	1	No	Yes	No
33	BK	985359	6	>3FB	12	2	4.5	4.5	1.00	2B	1	1	No	Yes	No
34	PL	657883	7	>3FB	14	1	5	3.5	1.43	2A	2	1	No	Yes	No
35	S	366102	7	>3FB	16	2	5	4	1.25	2A	2	1	No	No	No
36	SS	680101	6.5	>3FB	12	3	6	6	1.00	2B	1	1	No	Yes	No
37	MP	1115050	6	>3FB	10	3	5	4	1.25	2B	1	1	No	Yes	No
38	RA	1119787	6.5	>3FB	13.5	1	5	5	1.00	2B	1	2	No	Yes	No
39	GS	1113996	7	>3FB	13	3	6	5	1.20	3A	1	1	No	Yes	No
40	RK	70817	6.5	>3FB	13	3	5.5	4	1.30	2B	1	1	No	Yes	No
41	M	1195322	6	>3FB	12	3	5	3	1.67	2A	2	1	No	Yes	No
42	S	1200385	5.5	>3FB	11	2	4	5	0.80	2B	1	2	No	Yes	No
43	MR	1188770	9	>3FB	17	1	5	3	1.67	1	2	1	No	Yes	No
44	A	997856	8	>3FB	14	3	6	5	1.20	2B	1	1	No	No	No
45	A	996674	8.5	>3FB	15	3	5.5	4	1.38	2A	2	1	No	Yes	No
46	SK	996933	9.5	>3FB	14	3	5	4.5	1.11	2B	1	1	No	Yes	No
47	D	992871	7	>3FB	12.5	3	5.5	4	1.38	2B	1	1	No	Yes	No
48	R	192576	6	>3FB	11	3	5	4	1.25	2B	1	1	No	Yes	No
49	RK	1203318	6	>3FB	11.5	2	5.5	4	1.38	2B	1	1	No	Yes	No
50	AS	1118485	8	>3FB	15	2	5	5	1.00	2B	1	1	No	Yes	No
51	SS	1120085	7	>3FB	14	3	6	5	1.20	3A	1	2	No	Yes	No
52	LA	1035875	6	>3FB	12	1	5	4.5	1.11	2A	2	1	No	No	No
53	SS	791813	6	>3FB	12	2	5.5	4	1.38	2B	1	1	No	Yes	No
54	M	1140392	10	>3FB	16	1	5	4	1.25	2A	2	1	No	Yes	No
55	AKS	1089611	7	>3FB	14	4	6.5	5	1.30	2B	1	1	No	Yes	No
56	LS	1137562	7	>3FB	14	1	5	5.5	0.91	2B	1	1	No	Yes	No
57	M	255795	6.5	>3FB	13	1	5	4.5	1.11	2A	2	1	No	Yes	No

S.NO	NAME	MRD	AGE (in Yrs)	GENDER	RELIGION	HEIGHT (INCHES)	HEIGHT (CM)	WEIGHT(KG)	BMI	SURGERY	AIR WAY DENTITION	AIR WAY NECK MOVEMENT	AIR WAY Neck circumference (cm)	AIR WAY TMJ MOBILITY
58	HK	1080727	36	F	Sikh	5.3	161.5	54	20.69	VATS	Present	Adequate	36	Adequate
59	MR	11365584	60	M	Hindu	5.1	155.4	70	28.97	ETEP	Present	Adequate	38	Adequate
60	S	1203541	57	F	Hindu	5.1	155.4	87	36.00	Lap chole	Present	Adequate	39	Adequate
61	NB	1204214	50	M	Hindu	5.4	164.6	77	28.42	GIOT	Present	Adequate	38	Adequate
62	KK	120308	47	F	Hindu	5.7	173.7	80	26.50	Lap chole	Present	Adequate	38	Adequate
63	U	409165	32	F	Hindu	5	152.4	58	24.97	Lap chole	Present	Adequate	37	Adequate
64	R	1162301	34	F	Hindu	5.4	164.6	62	22.89	THL	Present	Adequate	35	Adequate
65	SS	80668	67	M	Hindu	5.4	164.6	80	29.53	Lap chole	Present	Adequate	36	Adequate
66	AK	1203415	20	M	Hindu	6	182.9	70	20.93	VATS	Present	Adequate	40	Adequate
67	J	1202113	55	F	Hindu	5.5	167.6	80	28.47	Lap Cholecystectomy	Present	Adequate	36	Adequate
68	SR	1203199	32	M	Hindu	5.6	170.7	90	30.89	Orif plating Zygoma	Present	Adequate	37	Adequate
69	MK	1043493	30	F	Hindu	5.2	158.5	60	23.88	Lap chole	Present	Adequate	37	Adequate
70	BK	1164433	76	F	Hindu	5.3	161.5	60	22.99	Lap chole	Present	Adequate	35	Adequate
71	SC	1203331	63	M	Hindu	5.3	161.5	70	26.82	Lap chole	Present	Adequate	40	Adequate
72	As	1203334	46	M	Sikh	5.8	176.8	55	17.60	Granuloma erocision	Present	Adequate	38	Adequate
73	UC	1203324	62	F	Hindu	5.1	155.4	60	24.83	Lap chole	Present	Adequate	37	Restricted
74	PK	290793	54	F	Hindu	5.3	161.5	77	29.51	Hernia Repair	Present	Adequate	40	Adequate
75	DR	644217	62	F	Hindu	5.3	161.5	60	22.99	Expl. Lapootmy SAIO	Present	Adequate	38	Adequate
76	H	1034880	79	F	Hindu	5.1	155.4	57	23.59	Right Hemicolectomy	Present	Adequate	40	Adequate
77	A	1020966	28	F	Hindu	5.5	167.6	99	35.23	Lump Exision	Present	Adequate	42	Adequate
78	JK	1119669	60	F	Hindu	5.3	161.5	53	20.31	Lap chole	Present	Adequate	38	Adequate
79	R	1101676	50	M	Sikh	5.9	179.8	84	25.97	FESS	Present	Adequate	39	Adequate
80	KK	833259	56	F	Sikh	5.1	155.4	56	23.17	Exp Lap & sigmoidectory	Present	Adequate	38	Adequate
81	SS	119447	43	M	Sikh	6	182.9	55	16.44	Laprotomy	Present	Adequate	37	Adequate
82	SK	485825	66	F	Sikh	5	152.4	80	34.44	Lap chole	Present	Adequate	41	Adequate
83	SS	1191084	46	M	Sikh	5.8	176.8	85	27.20	Lap Chole	Present	Adequate	35	Adequate
84	Ts	1188007	47	M	Sikh	5.7	173.7	77	25.51	Lap chole	Present	Adequate	47	Adequate
85	HK	1171296	31	F	Sikh	5.5	167.6	62	22.06	Daig & Lap Drauige	Present	Adequate	32	Adequate
86	N	1194572	53	F	Sikh	5.3	161.5	93	35.64	Exp. Laprotomacy for Int. Distriction	Present	Adequate	48	Adequate
87	S	1200785	40	F	Sikh	5.5	167.6	72	25.62	Axillary lump Removal	Present	Adequate	37	Adequate
88	YG	1201110	67	M	Hindu	5.11	155.8	120	49.47	Lap chole	Present	Adequate	47	Limited
89	A	1067091	33	F	Hindu	5.5	167.6	80	28.47	Lap chole	Present	Adequate	36	Adequate
90	N	1065113	60	F	Hindu	4.11	125.3	45	28.67	Ent Eroscopy	Present	Adequate	40	Adequate
91	SJ	1040951	52	F	Hindu	5.2	158.5	60	23.88	Enteroscopy	Present	Adequate	33	Adequate
92	A	1068912	33	F	Hindu	5.2	158.5	68	27.07	Lap chole	Present	Adequate	40	Adequate
93	H	1086796	51	M	Hindu	5.9	179.8	89	27.52	Lap chole	Present	Adequate	40	Adequate
94	G	4532	44	F	Sikh	5.4	164.6	85	31.38	TLH	Absent	Adequate	38	Unrestricted
95	D	1140595	46	M	Sikh	5.6	170.7	78	26.77	Lap chole	Present	Adequate	37	Adequate
96	SA	1160695	72	M	Hindu	5.6	170.7	78	26.77	Hepatic Jejunostomy Hepatectomy	Present	Adequate	38	Unrestricted
97	KS	1163927	51	M	Sikh	5.9	179.8	78	24.12	Exploration + Excision	Absent	Adequate	30	Adequate
98	B	576508	55	F	Hindu	5.4	164.6	60	22.15	Lap chole	Present	Adequate	38	Adequate
99	R	1137564	56	F	Sikh	6	182.9	72	21.53	Oesophagestomy	Present	Adequate	37	Adequate
100	SK	1179086	63	F	Sikh	5.3	161.5	70	26.82	Lap Chole	Missing Some	Adequate	38	Adequate
101	SK	1228532	66	M	Hindu	5.8	176.8	85	27.20	FESS	Present	Adequate	36	Adequate
102	HS	1150428	63	M	Sikh	5.11	155.8	86	35.45	Open Umblical Hernia Repair	Present	Adequate	41	Adequate
103	U	1226754	70	F	Hindu	5	152.4	57	24.54	UV Prolapro OPEN tysterectomy	Edentector	Adequate	34	Adequate
104	S	1226539	39	M	Sikh	5.6	170.7	84	28.83	Rectopency/Reaction	Present	Adequate	36	Adequate
105	RK	1228582	38	F	Hindu	5.6	170.7	69	23.68	Hernia Repair	Present	Restricted	38	Adequate
106	AK	1069816	56	M	Hindu	5.6	170.7	74	25.40	Lap chole	Present	Adequate	41	Unrestricted
107	SS	1208958	20	M	Sikh	5.6	170.7	70	24.03	Perineal wound Exploration	Absent	Adequate	36	Adequate
108	S	1224875	36	F	Muslim	5.6	170.7	83	28.49	Lap chole	Present	Adequate	36	Unrestricted
109	AK	1217141	49	M	Sikh	5.3	161.5	60	22.99	Stoma Closure	Present	Adequate	32	Unrestricted
110	AS	1219150	39	F	Hindu	5.3	161.5	53	20.31	Lap cystectomy	Absent	Adequate	33	Unrestricted
111	JS	1217152	35	M	Sikh	6.2	189.0	90	25.20	Wound Repair over injuiry	Absent	Adequate	35	Adequate
112	NG	1210697	59	F	Hindu	5.4	164.6	93	34.33	Partial Gressectomy functional neck dissection	Present	Adequate	37	Adequate
113	AS	612325	27	M	Sikh	5.2	158.5	72	28.66	Lap chole	Present	Adequate	36	Adequate
114	HK	1215076	29	F	Sikh	5.3	161.5	70	26.82	LCSS+Hysterectomy	Present	Adequate	34	Adequate

S.NO	NAME	MRD	Thyromental distance (cm)	mouth opening	Sternomental distance (cm)	Mallampati classification	Nasal Scale LENGTH	Nasal Scale WIDTH	Nasal Scale RATIO	Cormack Lehane Classification GRADE	CL GROUP	Attempts of tracheal intubation	change of laryngoscopic blade yes/no	use of stillete yes/no	Alternative devices Yes/No
58	HK	1080727	6.3	>3FB	13	3	5	4.5	1.11	2B	1	1	No	Yes	No
59	MR	11365584	8	>3FB	14	2	6	5.5	1.09	2A	2	1	No	Yes	No
60	S	1203541	5	>3FB	11	4	5	5	1.00	3A	1	2	No	Yes	No
61	NB	1204214	7	>3FB	12	3	5	4.5	1.11	2B	1	1	No	Yes	No
62	KK	120308	6.5	>3FB	13	2	5	4	1.25	3A	1	1	No	Yes	No
63	U	409165	9	>3FB	14	3	5	3.5	1.43	2A	2	1	No	Yes	No
64	R	1162301	7	>3FB	13	1	4	3	1.33	2A	2	1	No	Yes	No
65	SS	80668	7	>3FB	12.5	2	5	3.5	1.43	2A	2	1	No	Yes	No
66	AK	1203415	7	>3FB	14	1	5	4	1.25	2A	2	1	No	Yes	No
67	J	1202113	9	>3FB	14	2	5.5	4	1.38	2A	2	1	No	Yes	No
68	SR	1203199	6	>3FB	13	4	6	3.5	1.71	2A	2	1	No	Yes	No
69	MK	1043493	7	>3FB	14	2	5.5	3.5	1.57	2A	2	1	No	Yes	No
70	BK	1164433	6.5	>3FB	12	2	6	3.5	1.71	2A	2	1	No	Yes	No
71	SC	1203331	8	>3FB	11	3	5	4	1.25	2B	1	1	No	Yes	No
72	As	1203334	7	>3FB	13	3	5.5	4.5	1.22	2A	2	1	No	Yes	No
73	UC	1203324	6.9	>3FB	13.2	3	5.5	3.5	1.57	2A	2	1	No	Yes	No
74	PK	290793	10	>3FB	15	2	5.5	4	1.38	1	2	1	No	Yes	No
75	DR	644217	6.5	>3FB	13	4	6	4.5	1.33	2B	1	1	No	Yes	No
76	H	1034880	7	>3FB	14	2	5.5	5	1.10	2A	2	1	No	Yes	No
77	A	1020966	8	>3FB	14	2	5	4	1.25	2A	2	1	No	Yes	No
78	JK	1119669	6.5	>3FB	13.5	3	5.5	4.1	1.34	2B	1	1	No	Yes	No
79	R	1101676	7	>3FB	14	3	5	4.5	1.11	2B	1	1	No	Yes	No
80	KK	833259	8	>3FB	16	3	4.5	3.5	1.29	2B	1	1	No	Yes	No
81	SS	119447	6.8	>3FB	15	1	5	4	1.25	2A	2	1	No	Yes	No
82	SK	485825	6.5	>3FB	15	1	5	4.5	1.11	2A	2	1	No	Yes	No
83	SS	1191084	8	>3FB	15	3	6	4	1.50	2A	2	1	No	Yes	No
84	Ts	1188007	6	>3FB	12	4	5	5	1.00	2B	1	1	No	Yes	No
85	HK	1171296	6.8	>3FB	13	2	5.5	4	1.38	2A	2	1	No	Yes	No
86	N	1194572	6.9	>3FB	13	3	5	5	1.00	2B	1	1	No	Yes	No
87	S	1200785	10	>3FB	16	3	5.5	4	1.38	2A	2	1	No	Yes	No
88	YG	1201110	9	>3FB	14	2	5.5	5	1.10	2B	1	1	No	Yes	No
89	A	1067091	6	>3FB	13	2	5	4	1.25	2A	2	1	No	Yes	No
90	N	1065113	7	>3FB	14	2	6	5	1.20	2A	2	1	No	Yes	No
91	SJ	1040951	8	>3FB	13.5	2	5	5	1.00	2A	2	1	No	Yes	No
92	A	1068912	7	>3FB	13	3	5	4	1.25	2B	1	1	No	Yes	No
93	H	1086796	7	>3FB	13	3	6.5	4.5	1.44	2B	1	1	No	Yes	No
94	G	4532	6.7	>3FB	12	3	5.5	4	1.38	2B	1	1	No	Yes	No
95	D	1140595	6	>3FB	13	4	4.5	4	1.13	4	1	1	No	Yes	No
96	SA	1160695	7	>3FB	14	3	5.5	4.5	1.22	2B	1	1	No	Yes	No
97	KS	1163927	6.8	>3FB	10	4	5.5	4	1.38	2B	1	1	No	Yes	No
98	B	576508	7	>3FB	13.5	1	5	4.5	1.11	2A	2	1	No	Yes	No
99	R	1137564	7	>3FB	13	3	5	5	1.00	2A	2	1	No	Yes	No
100	SK	1179086	7	>3FB	13	4	5	4	1.25	2B	1	1	No	Yes	No
101	SK	1228532	7	>3FB	14	2	5	4.5	1.11	2B	1	1	No	Yes	No
102	HS	1150428	11	>3FB	16	4	5.5	4.5	1.22	3A	1	1	No	Yes	No
103	U	1226754	7	>3FB	13	3	5	4	1.25	2A	2	1	No	Yes	No
104	S	1226539	7	>3FB	14	2	6	4	1.50	2A	2	1	No	Yes	No
105	RK	1228582	6.8	>3FB	13	3	4.5	4	1.13	2B	1	1	No	Yes	No
106	AK	1069816	8	>3FB	14	2	5.5	5.5	1.00	2B	1	1	No	Yes	No
107	SS	1208958	8	>3FB	14	3	5.5	4	1.38	2B	1	2	No	Yes	No
108	S	1224875	10	>3FB	15	2	4.5	4	1.13	2B	1	1	No	Yes	No
109	AK	1217141	9	>3FB	14	1	5	4	1.25	2B	1	1	No	Yes	No
110	AS	1219150	8	>3FB	11	2	5	4.5	1.11	2A	2	1	No	Yes	No
111	JS	1217152	11	>3FB	12	3	6.5	4.5	1.44	2B	1	1	No	Yes	No
112	NG	1210697	5	>3FB	12	3	5	4	1.25	2B	1	1	No	Yes	No
113	AS	612325	6.5	>3FB	13	2	5.5	3.5	1.57	2A	2	1	No	Yes	No
114	HK	1215076	7	>3FB	14	2	5	3.5	1.43	2A	2	1	No	Yes	No

S.NO	NAME	MRD	AGE (in Yrs)	GENDER	RELIGION	HEIGHT (INCHES)	HEIGHT (CM)	WEIGHT(KG)	BMI	SURGERY	AIR WAY DENTITION	AIR WAY NECK MOVEMENT	AIR WAY Neck circumference (cm)	AIR WAY TMJ MOBILITY
115	N	162710	40	M	Sikh	5.9	179.8	80	24.74	Lap chole	Present	Adequate	36	Adequate
116	HK	1216460	24	F	Sikh	5.3	161.5	50	19.16	Lap chole	Present	Adequate	33	Adequate
117	D	121122	33	M	Hindu	5.8	176.8	37	11.84	Lap chole	Present	Adequate	39	Adequate
118	GK	1138867	43	F	Sikh	5.4	164.6	72	26.58	Lap chole+ lap hysterectomy + Lap hernia Repair	Absent	Adequate	35	Adequate
119	GL	1188788	33	M	Hindu	5.6	170.7	54	18.53	CPO angle Epidermaid	Present	Adequate	35	Adequate
120	PK	803957	67	M	Hindu	5.6	170.7	54	18.53	Lap chole	Present	Adequate	34	Adequate
121	PS	1132500	39	F	Hindu	5	152.4	47	20.24	Stoma Closure	Present	Adequate	37	Adequate
122	DJ	12237	57	M	Hindu	5.7	173.7	85	28.16	Urethroplasy(BMA)	Present	Adequate	38	Adequate
123	JK	444628	46	F	Sikh	5.4	164.6	65	23.99	Sinus Excision + DJ Stenting	Present	Adequate	36	Adequate
124	S	1125038	62	M	Sikh	5.3	161.5	75	28.74	Biliary Daraunige	Present	Adequate	39	Adequate
125	KK	1016381	18	F	Sikh	5.4	164.6	50	18.46	Cramioplasty	Present	Adequate	33	Adequate
126	MS	984897	25	M	Sikh	5.9	179.8	65	20.10	Cranioplasty	Present	Adequate	35	Adequate
127	R	1262248	35	F	Sikh	5.3	161.5	93	35.64	Lap chole	Present	Adequate	34	Adequate
128	A	1118347	57	M	Sikh	5.4	164.6	40	14.77	Panc necrosectomy	Present	Adequate	35	Adequate
129	P	55837	59	F	Hindu	5.2	158.5	75	29.86	Lap chole	Present	Adequate	36	Adequate
130	S	1133404	51	F	Sikh	5.3	161.5	60	22.99	VATS	Present	Adequate	37	Adequate
131	Kd	1177911	55	F	Hindu	5.3	161.5	69	26.44	URS	Present	Adequate	38	Adequate
132	Kb	37863	50	F	Hindu	5.1	155.4	67	27.73	TLH	Present	Adequate	39	Adequate
133	K	1126191	25	F	Sikh	5.2	158.5	43	17.12	face suturing	Present	Adequate	33	Adequate
134	P	1125534	46	F	Sikh	5.4	164.6	80	29.53	PIVD	Present	Adequate	35	Adequate
135	MS	984897	25	M	Sikh	5.9	179.8	65	20.10	Cranioplasty	Present	Adequate	34	Adequate
136	Ss	1261709	35	M	Sikh	5.5	167.6	75	26.69	Pseudocyst drainage	Present	Adequate	33	Adequate
137	Gs	1239830	27	M	Sikh	5.6	170.7	80	27.46	Left pinna repair	Present	Adequate	32	Adequate
138	TA	188620	71	F	Hindu	5.3	161.5	51	19.54	LAR	Present	Adequate	36	Adequate
139	Ds	1217167	55	M	Sikh	5.8	176.8	75	24.00	cranioplasty	Present	Adequate	34	Adequate
140	K	1186975	69	F	Hindu	5.1	155.4	65	26.90	Lap chole	Present	Adequate	35	Adequate
141	Rk	1267961	62	M	Hindu	5.7	173.7	72	23.85	FESS	Present	Adequate	33	Adequate
142	Gs	1270990	19	M	Sikh	5.7	173.7	68	22.53	exp lap	Present	Adequate	32	Adequate
143	NS	1267283	69	M	Sikh	5.8	176.8	70	22.40	R radical nephrectomy	Present	Adequate	36	Adequate
144	Sr	1266738	48	F	Hindu	5.2	158.5	60	23.88	L radical nephrecomy	Present	Adequate	35	Adequate
145	p	1267297	29	F	Hindu	5.8	176.8	70	22.40	lap cystectomy	Present	Adequate	38	Adequate
146	Gr	1187309	63	M	Hindu	5.4	164.6	65	23.99	Lap chole	Present	Adequate	31	Adequate
147	Js	1283276	35	M	Sikh	5.1	155.4	78	32.28	Lap heller's myotomy	Present	Adequate	37	Adequate
148	Cv	1285904	32	M	Hindu	174	5303.5	73	0.03	Lap Appendectory	Present	Adequate	33	Adequate
149	K	1200422	65	M	Hindu	5.3	161.5	70	26.82	laprotomy	Missing Some	Adequate	35	Adequate
150	Rd	1146451	45	F	Hindu	5	152.4	45	19.38	Cranioplasty	Present	Adequate	39	Adequate
151	S	38169	61	F	Sikh	5.4	164.6	61	22.52	Incisional hernia repair	Present	Adequate	34	Adequate
152	dj	81404	82	F	Hindu	5.2	158.5	78	31.05	lap chole	Present	Adequate	32	Adequate
153	S	1281629	29	F	Hindu	5.5	167.6	80	28.47	LSCS	Present	Adequate	33	Adequate
154	B	428169	55	M	Hindu	5.6	170.7	54	18.53	laprotomy	Present	Adequate	32	Adequate
155	Ms	243228	32	M	Sikh	5.8	176.8	80	25.60	laprotomy	Present	Adequate	33	Adequate
156	A	1127199	35	M	Hindu	5.7	173.7	78	25.84	Cranioplasty	Present	Adequate	36	Adequate
157	P	1270120	35	F	Hindu	5.2	158.5	56	22.29	Hepato jejunostomy	Present	Adequate	37	Adequate
158	Pk	1204054	56	F	Sikh	5.3	161.5	70	26.82	Lap chole	Present	Adequate	38	Adequate
159	Kk	421302	42	F	Sikh	5.2	158.5	50	19.90	laprotomy	Present	Adequate	35	Adequate
160	Ks	1235841	50	M	Sikh	5.9	179.8	80	24.74	Cranioplasty	Present	Adequate	36	Adequate
161	Kk	4368	51	M	Hindu	5.3	161.5	80	30.66	Lap chole	Present	Adequate	36	Adequate
162	P	7294	59	F	Hindu	5.4	164.6	68	25.10	Lap chole	Present	Adequate	36	Adequate
163	JK	1274275	54	F	Sikh	5.4	164.6	50	18.46	Lap chole	Absent	Adequate	36	Adequate
164	Ds	305259	31	M	Hindu	171	5212.1	65	0.02	Lap chole	Present	Adequate	34	Adequate
165	Sk	740801	37	F	Sikh	5.5	167.6	83	29.53	lap chole	Present	Adequate	35	Adequate
166	N	1241175	34	F	Hindu	5.2	158.5	70	27.87	Spleenectomy for splenic cyst	Present	Adequate	36	Adequate
167	N	3286132	36	F	Hindu	5.5	167.6	87	30.96	optic nerve fenertration	Present	Adequate	37	Adequate
168	CR	1287668	64	M	Hindu	5.3	161.5	80	30.66	ercp	Present	Adequate	38	Adequate
169	As	1277065	40	M	Sikh	5.7	173.7	76	25.18	Spleenectomy for splenic cyst	Present	Restricted	35	Adequate
170	SS	1297494	65	M	Hindu	5.5	167.6	83	29.53	Lap cholecystectomy	Missing Some	Adequate	37	Adequate
171	RA	1287827	52	M	Hindu	5.8	176.8	96	30.72	appendicectomy	Present	Adequate	35	Adequate

S.NO	NAME	MRD	Thyromental distance (cm)	mouth opening	Sternomental distance (cm)	Mallampati classification	Nasal Scale LENGTH	Nasal Scale WIDTH	Nasal Scale RATIO	Cormack Lehane Classification GRADE	CL GROUP	Attempts of tracheal intubation	change of laryngoscopic blade yes/no	use of stillete yes/no	Alternative devices Yes/No
115	N	162710	7	>3FB	14	2	5	5	1.00	2A	2	1	No	Yes	No
116	HK	1216460	8.5	>3FB	12	2	4.5	4	1.13	2A	2	1	No	Yes	No
117	D	121122	5	>3FB	13	2	5	3.5	1.43	2A	2	1	No	Yes	No
118	GK	1138867	6	>3FB	11	2	6	5	1.20	2A	2	1	No	Yes	No
119	GL	1188788	16	>3FB	11	1	6	4	1.50	2A	2	1	No	Yes	No
120	PK	803957	8	>3FB	12	2	5.5	4.4	1.25	2A	2	1	No	Yes	No
121	PS	1132500	6.9	>3FB	12	2	5.5	4	1.38	2B	1	1	No	Yes	No
122	DJ	12237	6.5	>3FB	11	1	5	5	1.00	2A	2	1	No	Yes	No
123	JK	444628	7	>3FB	13	4	5.5	4	1.38	2A	2	1	No	Yes	No
124	S	1125038	7	>3FB	12	3	6	5	1.20	3A	1	1	No	Yes	No
125	KK	1016381	6	>3FB	14	2	5	4	1.25	2B	1	1	No	Yes	No
126	MS	984897	6.8	>3FB	12	2	6	5	1.20	1	2	1	No	Yes	No
127	R	1262248	9	>3FB	11	4	5	4	1.25	2A	2	1	No	Yes	No
128	A	1118347	6	>3FB	14	2	5	4.5	1.11	2B	1	1	No	Yes	No
129	P	55837	6	>3FB	13	2	5.5	4	1.38	2B	1	1	No	Yes	No
130	S	1133404	6.5	>3FB	15	4	5.5	5	1.10	2B	1	1	No	Yes	No
131	Kd	1177911	6.5	>3FB	12	2	5	4	1.25	2B	1	1	No	Yes	No
132	Kb	37863	8	>3FB	12	1	5.5	4.5	1.22	2B	1	1	No	Yes	No
133	K	1126191	6.8	>3FB	14	4	5	3.5	1.43	1	2	1	No	Yes	No
134	P	1125534	6.5	>3FB	13	3	5	4	1.25	2A	2	1	No	Yes	No
135	MS	984897	6.8	>3FB	12	2	6	5	1.20	1	2	1	No	Yes	No
136	Ss	1261709	9	>3FB	12	2	5	5	1.00	2B	1	1	No	Yes	No
137	Gs	1239830	6.5	>3FB	11	3	5	4.5	1.11	2B	1	1	No	Yes	No
138	TA	188620	9.5	>3FB	12	1	6	4	1.50	1	2	1	No	No	No
139	Ds	1217167	8	>3FB	13	4	5	4	1.25	2B	1	1	No	Yes	No
140	K	1186975	6.5	>3FB	14	2	5	4	1.25	1	2	1	No	Yes	No
141	Rk	1267961	7	<3FB	14	3	6.5	5.5	1.18	2B	1	1	No	Yes	No
142	Gs	1270990	9	>3FB	12	2	6	4	1.50	2A	2	1	No	Yes	No
143	NS	1267283	7	>3FB	14	3	6.5	4.5	1.44	2B	1	1	No	Yes	No
144	Sr	1266738	6.2	>3FB	12	3	5.5	4	1.38	3A	1	1	No	Yes	No
145	p	1267297	10	>3FB	15	2	5.5	4	1.38	1	2	1	No	Yes	No
146	Gr	1187309	9	>3FB	13	2	7	5	1.40	2A	2	1	No	Yes	No
147	Js	1283276	9.5	2.5FB	15	4	5	4	1.25	2B	1	1	No	Yes	No
148	Cv	1285904	6.8	>3FB	11	1	5	4.5	1.11	2A	2	1	No	Yes	No
149	K	1200422	8.5	3Fb	13	3	5.5	5	1.10	2B	1	1	No	Yes	No
150	Rd	1146451	6.5	>3FB	13	3	5.5	4.5	1.22	2B	1	1	No	Yes	No
151	S	38169	9	>3FB	13	4	5.5	4	1.38	2B	1	1	No	Yes	No
152	dj	81404	8	>3FB	13	3	5.5	3	1.83	2B	1	1	No	Yes	No
153	S	1281629	6.5	>3FB	13	2	5	3.5	1.43	2A	2	1	No	Yes	No
154	B	428169	9	>3FB	13	2	5	4	1.25	2B	1	1	No	Yes	No
155	Ms	243228	8	>3FB	15	2	5.5	3	1.83	2A	2	1	No	Yes	No
156	A	1127199	7	3Fb	13	4	5	4	1.25	2B	1	1	No	Yes	No
157	P	1270120	7	>3FB	13	1	5	4	1.25	2A	2	1	No	Yes	No
158	Pk	1204054	9	>3FB	13	3	5.5	5	1.10	2B	1	1	No	Yes	No
159	Kk	421302	8	>3FB	14	2	4.5	3	1.50	2A	2	1	No	Yes	No
160	Ks	1235841	9	>3FB	13	4	6.5	4.5	1.44	2B	1	1	No	Yes	No
161	Kk	4368	8	>3FB	15	2	5.5	4.5	1.22	2A	2	1	No	Yes	No
162	P	7294	9	>3FB	13	3	5	3.5	1.43	2A	2	1	No	Yes	No
163	JK	1274275	8	>3FB	13	2	5.5	4	1.38	2A	2	1	No	Yes	No
164	Ds	305259	9	>3FB	14	2	6	5	1.20	2B	1	1	No	Yes	No
165	Sk	740801	8	>3FB	12	2	5	4	1.25	2B	1	1	No	Yes	No
166	N	1241175	9	>3FB	12	2	5	3.5	1.43	2A	2	1	No	Yes	No
167	N	3286132	9	3Fb	14	3	5.5	4.5	1.22	2B	1	1	No	Yes	No
168	CR	1287668	8	>3FB	13	2	6	4	1.50	2A	2	1	No	Yes	No
169	As	1277065	9	2fb	13	4	5	3	1.67	2A	2	1	No	Yes	No
170	SS	1297494	8	3Fb	12	2	6	4	1.50	2A	2	1	No	Yes	No
171	RA	1287827	9	>3FB	13	2	5	4	1.25	2B	1	1	No	Yes	No

S.NO	NAME	MRD	AGE (in Yrs)	GENDER	RELIGION	HEIGHT (INCHES)	HEIGHT (CM)	WEIGHT(KG)	BMI	SURGERY	AIR WAY DENTITION	AIR WAY NECK MOVEMENT	AIR WAY Neck circumference (cm)	AIR WAY TMJ MOBILITY
172	Rr	1192532	57	F	Hindu	5.8	176.8	87	27.84	Lap chole	Present	Adequate	32	Adequate
173	Ms	1269697	34	M	Sikh	5.7	173.7	70	23.19	Necrosectomy	Present	Adequate	37	Adequate
174	Gs	1299023	46	M	Sikh	5	152.4	62	26.69	Hernia Repair	Present	Adequate	37	Adequate
175	Jk	1298049	50	F	Sikh	5	152.4	47	20.24	Rectopexy	Present	Adequate	36	Adequate
176	Gs	1296165	60	M	Sikh	5.1	155.4	70	28.97	laprotomy	Present	Adequate	39	Adequate
177	Gs	1297813	45	M	Sikh	5.7	173.7	76	25.18	Below knee amputation	Present	Adequate	37	Adequate
178	Sr	1300342	22	M	Hindu	5.6	170.7	60	20.59	pesudocyst pancreas	Present	Adequate	33	Adequate
179	S	1298416	34	M	Hindu	5.2	158.5	70	27.87	TLH	Present	Adequate	37	Adequate
180	Kb	1306920	56	F	Hindu	5.7	173.7	96	31.80	R radical nephrectomy	Present	Adequate	37	Adequate
181	DS	1291490	44	M	Hindu	5.1	155.4	64	26.49	exploratory laprotomy	Present	Adequate	38	Adequate
182	Js	1304657	61	M	Sikh	5.1	155.4	80	33.11	L radical nephrecomy	Present	Adequate	34	Adequate
183	AK	1294248	40	M	Hindu	5.2	158.5	70	27.87	R radical nephrectomy	Present	Adequate	36	Adequate
184	M	1306833	33	F	Hindu	5.3	161.5	50	19.16	Lap appendectomy	Present	Adequate	38	Adequate
185	S	1288277	38	F	Hindu	5.3	161.5	60	22.99	nephrectomy	Present	Adequate	36	Adequate
186	Rk	1284176	71	M	Hindu	5.7	173.7	58	19.22	GJ	Present	Adequate	33	Adequate
187	Mc	1305805	20	M	Hindu	5.5	167.6	56	19.93	Dorsospine SOL	Present	Adequate	34	Adequate
188	S	323080	64	M	Hindu	5.7	173.7	65	21.53	Dorsal laminectomy	Missing Some	Adequate	32	Adequate
189	Is	1286797	41	M	Sikh	5.6	170.7	72	24.71	Lipoma excision	Present	Adequate	33	Adequate
190	My	1310053	74	M	Muslim	5.1	155.4	50	20.69	Radical cholecystectomy	Present	Adequate	35	Adequate
191	Ak	1313320	25	M	Hindu	5.7	173.7	58	19.22	laprotomy	Present	Adequate	36	Adequate
192	Pk	1256775	70	F	Sikh	5.1	155.4	50	20.69	Lap chole	Present	Adequate	32	Adequate
193	Gk	1285745	72	M	Hindu	5.1	155.4	93	38.49	Lap and proceed	Present	Adequate	34	Adequate
194	KK	1304266	69	F	Sikh	5.3	161.5	75	28.74	Laryngectomy	Present	Adequate	33	Adequate
195	SH	1308528	37	M	Muslim	5.1	155.4	84	34.76	FESS	Present	Adequate	35	Adequate
196	PS	608564	59	M	Hindu	5.6	170.7	84	28.83	ETEP	Present	Adequate	38	Adequate
197	Kk	1313262	71	M	Hindu	5.2	158.5	38	15.13	R inguinal hernia	Present	Adequate	31	Adequate
198	K	529234	45	F	Hindu	5.5	167.6	66	23.48	Lap cholecystectomy	Present	Adequate	39	Adequate
199	Sk	1313582	35	F	Hindu	5.4	164.592	72	26.58	Lap Cholecystectomy	Present	Adequate	35	Adequate
200	Ks	1219052	40	M	Sikh	5.5	167.64	78	27.75	Decompressive craniotomy	Present	Adequate	36	Adequate

S.NO	NAME	MRD	Thyromental distance (cm)	mouth opening	Sternomental distance (cm)	Mallampati classification	Nasal Scale LENGTH	Nasal Scale WIDTH	Nasal Scale RATIO	Cormack Lehane Classification GRADE	CL GROUP	Attempts of tracheal intubation	change of laryngoscopic blade yes/no	use of stillete yes/no	Alternative devices Yes/No
172	Rr	1192532	7.5	3Fb	11	3	5	3	1.67	2A	2	1	No	Yes	No
173	Ms	1269697	8	>3FB	11	4	5	4	1.25	2B	1	1	No	Yes	No
174	Gs	1299023	7	>3FB	14	2	4.5	4	1.13	3A	1	1	No	Yes	No
175	Jk	1298049	8	2.5FB	13	4	5	3.5	1.43	2A	2	1	No	Yes	No
176	Gs	1296165	7	3Fb	14	2	5	4	1.25	2A	2	1	No	Yes	No
177	Gs	1297813	8	>3FB	12	3	6	4	1.50	2A	2	1	No	Yes	No
178	Sr	1300342	8	3Fb	14	3	5	3	1.67	2A	2	1	No	Yes	No
179	S	1298416	7	>3FB	13	3	5.5	4	1.38	2A	2	1	No	Yes	No
180	Kb	1306920	8	3Fb	12.5	4	5	4.5	1.11	3A	1	1	No	Yes	No
181	DS	1291490	9	3Fb	13	2	5	4	1.25	2B	1	1	No	Yes	No
182	Js	1304657	8	>3FB	14	3	4	3.5	1.14	2B	1	1	No	Yes	No
183	AK	1294248	9	3Fb	13	2	5	4	1.25	2B	1	1	No	Yes	No
184	M	1306833	7	3Fb	12	2	5.5	4	1.38	2A	2	1	No	Yes	No
185	S	1288277	8	3Fb	12	4	5	4	1.25	2B	1	1	No	Yes	No
186	Rk	1284176	7	3Fb	12	2	5	4	1.25	2B	1	1	No	Yes	No
187	Mc	1305805	7	3Fb	11	2	5	4	1.25	2B	1	1	No	Yes	No
188	S	323080	7	3Fb	12	1	5	4	1.25	2B	1	1	No	Yes	No
189	Is	1286797	6.5	>3FB	12	1	5	3	1.67	2A	2	1	No	Yes	No
190	My	1310053	7	3Fb	13	3	5	3.5	1.43	2A	2	1	No	Yes	No
191	Ak	1313320	7	3Fb	12	2	5.5	3	1.83	2A	2	1	No	Yes	No
192	Pk	1256775	8	3Fb	13	3	5	4	1.25	2A	2	1	No	Yes	No
193	Gk	1285745	7	3Fb	11	2	5	4.5	1.11	2B	1	1	No	Yes	No
194	KK	1304266	6.5	3Fb	12	1	5	3	1.67	2A	2	1	No	Yes	No
195	SH	1308528	7	3Fb	12	2	5	4.5	1.11	2B	1	1	No	Yes	No
196	PS	608564	8	3Fb	13	4	5	5	1.00	4	1	1	No	Yes	No
197	Kk	1313262	8	3Fb	11	2	5	3	1.67	2A	2	1	No	Yes	No
198	K	529234	7	3Fb	14	2	4	3	1.33	2A	2	1	No	Yes	No
199	Sk	1313582	7	>3FB	13	2	5	3	1.67	2A	2	1	No	Yes	No
200	Ks	1219052	8	>3FB	14	2	5	4	1.25	2A	2	1	No	Yes	No

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Date 24/09/21

The Principal,
DMC, Ludhiana.

Subject: **Approval of Plan of Thesis.**

This is to inform you that the Faculty of Medical Sciences in its meeting held on 29.10.2021 has approved the plan of thesis of **Anubala Kainth**, a student of your college for **MD Anaesthesiology** along with the names of Supervisor/Co-Supervisor as under:-

Topic Plan of Thesis
Assessment of nasal scale as a predictor of difficult intubation.

Supervisor
Dr. Kamakshi Garg
Assoc. Prof.,
Dept. of Anaesthesiology,
DMCH, Ludhiana.

Co-Supervisor

Dr. Sandeep Kundra
Prof.,
Dept. of Anaesthesiology,
DMCH, Ludhiana.

Dr. Hitant Vohra
Prof. & Head,
Dept. of Anatomy,
DMCH, Ludhiana.

The student has to submit the four copies of thesis (along with PDF format) , to the Controller of Examinations, BFUHS, Faridkot, at least six months before the commencement of theory examination, if he/she is otherwise eligible to take the examination. He /She must directed to attach a photocopy of this letter with the forwarding letter while submitting thesis to the University along with the letter of approval of University for change of supervisor/Co-Supervisor, change of topic,(if any).

Dr. S P Singh MS(Oph)
Controller of Examinations

Note :

7. *If any discrepancy found regarding topic of thesis or Supervisor/Co-Supervisor, inform undersigned within one month after issue of this letter.*
8. *The student may submit the thesis as per the schedule already conveyed i.e for May/June examination 30th Nov of the preceding the year of examination and for Nov/Dec examinations 31st May of the year of examination.*

ASSESSMENT OF NASAL SCALE AS A PREDICTOR OF DIFFICULT INTUBATION

THESIS PROPOSAL

FOR APPROVAL OF SUBJECT OF THESIS TO BE SUBMITTED

IN PARTIAL FULFILMENT OF THE REQUIREMENTS

FOR THE DEGREE OF

DOCTOR OF MEDICINE

In

ANAESTHESIOLOGY

OF THE

BABA FARID UNIVERSITY OF HEALTH SCIENCES

FARIDKOT

MARCH 2021

Dr ANUBALA KAINTH

DEPARTMENT OF ANAESTHESIOLOGY
DAYANAND MEDICAL COLLEGE & HOSPITAL, LUDHIANA
LUDHIANA, PUNJAB-141001

CERTIFICATE OF FACILITIES AVAILABLE

This is to certify that the facilities for work on the subject of thesis titled **"ASSESSMENT OF NASAL SCALE AS A PREDICTOR OF DIFFICULT INTUBATION"** exist in the Department of Anaesthesiology at Dayanand Medical College and Hospital, Ludhiana and will be provided to the candidate. We will see that the data being included in the thesis are genuine and is collected by the candidate herself under our supervision and guidance.

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Date: 15/3/21

APPROVAL PROFORMA
BY
RESEARCH & ETHICAL COMMITTEE
DAYANAND MEDICAL COLLEGE & HOSPITAL, LUDHIANA

Name of candidate	Dr Anubala kainth
Department	Anaesthesia
Topic of Thesis	ASSESSMENT OF NASAL SCALE AS A PREDICTOR OF DIFFICULT INTUBATION
Likely date of appearing in PG examination	MAY-JUNE 2023
Date of enrollment	26th July 2020
Name of Head of Department	Dr. Dinesh Sood
1) Supervisor **2) Co-Supervisor**	Dr. Kamakshi Garg Dr. Sandeep Kundra Dr. Hitant Vohra
Signature of Members of Research Committee with Stamp	**Signature of Members of Ethics Committee with Stamp**
Dr. Harpreet Kaur (Professor & Head, Pathology)	Mr. R K Sharma (Legal Expert)
Dr. Jaspal Singh (Professor & Head, Surgery)	Dr. Ramit Mahajan (Associate Professor, Gastroenterology)
Dr. Dinesh Gupta (Professor & Head, Medicine)	Dr. Anu Sharma (Professor, Anatomy)
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	Dr. Gagandeep Singh (Secretary, Ethics Committee Professor & Head, Neurology)

Approved: Yes / No

Dr. Sandeep Puri
Chairperson
Research Committee

Approved: Yes / ~~No~~

Prof. Arvind Malhotra
Chairperson
Ethics Committee

BABA FARID UNIVERSITY OF HEALTH SCIENCES, FARIDKOT

PROFORMA FOR REGISTRATION OF SUBJECT FOR DISSERTATION

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3	COURSE OF STUDY AND SUBJECT	M.D. ANAESTHESIOLOGY
4	DATE OF ADMISSION OF COURSE	26JULY 2020
5	TITLE OF THE TOPIC	ASSESSMENT OF “NASAL SCALE” AS PREDICTOR OF DIFFICULT INTUBATION

6. BRIEF RESUME OF THE INTENDED WORK

6.1 NEED FOR THE STUDY

Every airway guideline recommends a thorough assessment of the airway management. This assessment is mandatory for an anesthesiologist as the first step towards successful airway management so as to identify a potentially difficult airway and make necessary preparation to deal with it.[1,2] Inadequate ventilation, esophageal intubation and difficult tracheal intubation are the most common mechanism that leads to respiratory related adverse outcomes in anesthesia practice. An accurate preoperative prediction of potential difficulty with intubation can help in reducing the incidence of respiratory related injury.[3] By observing the anatomical landmarks and clinical factors associated with difficult intubation preoperatively, an anesthesiologist is able to avert the potential danger of loss of airway hence decreasing the morbidity in the patient.[4]. Numerous ways of conducting airway assessment such as Mallampati test, thyromental distance, sternomental distance have been used to predict the unanticipated difficult laryngoscopic tracheal intubation.[5,6]. Certain criterias such as the opening of mouth, protrusion of mandible, body mass index and radiography of head and neck are also used to predict difficult intubation but it is still questionable whether we can actually predict difficulty in intubation with these various parameters.[7]. As the prediction of a difficult intubation is not dependent on a single parameter, so a new method, “Nasal scale score” was studied by Bostan et al as a predictor of difficult intubation. [8] They calculated this scale on their subset of Turkish population by measuring the distance between radiix nasii and nasal tip and then dividing it with the distance between two alar cartilage domes; i.e longitudinal distance is divided by horizontal distance and expressed as a number within a range of 1.22-2.3. They found Nasal scale score <1.4 as a predictor of difficult intubation.[8] This is a quick and easy to perform bed side test done with the help of measuring tape. The instructions required for both the observer and patient are extremely easy. Thus there is less probability of misinterpretation while performing this test. This test may also

become a useful tool in patients who are not able to comprehend with the anaesthesiologist commands like certain syndromic patients or mentally retarded patients. It has been seen that higher incidence of difficult intubation occurs in human beings with typical nose structure as varied sizes and shapes of nose are seen amongst different individuals. Literature is scarce in use of this Nasal Scale score as a predictor of difficult intubation in Indian population.

Hence we propose to employ Nasal Scale score in our subset of population and compare it with Modified Mallampati classification, sternomental distance and thyromental distance in terms of predicting the difficulty of intubation determined by Cormack – Lehane (CL) classification.

6.2 REVIEW OF LITERATURE

Normal airway begins functionally at nares. Upper airway comprises of all the structures that act as passage of air from nostrils or mouth upto the larynx. Nasal passages open posteriorly by the way of posterior nares or choanae into the nasopharynx. The nose develops from the pharyngeal arcus, which is the stem of the neck, mandible and face.[9] The different anatomic structures of head and neck and upper airway helps in predicting difficult airway. The methodology of different airway assessment tests like mallampati classification, thyromental distance, sternomental distance originated from the anatomical structure of oropharynx and neck; therefore, it is possible that its dimensions and anatomical shape may correlate well with the nasopharynx and neck that form the airway.[10]

Patients scheduled for general anesthesia may present with difficulty at intubation. Preanesthetic examination of the airways is of utmost importance for an anesthesiologist in assessing the risk of difficult intubation. Mallampati classification, thyromental distance, sternomental distance, mouth opening, protrusion of the mandible, position and size of teeth, stability and elasticity of the atlanto -occipital joint are still used to evaluate the airway during the preoperative visit.[11] Depending on many patient characteristics and circumstances, difficulty and delay at intubation may cause or increase risks of hypoxia, hypercarbia, direct airway trauma, brain damage and myocardial cell damage.[12,13] These risks can be lowered by predicting the difficulty at intubation, thereby allowing for more planning and the appropriate preparation of required equipment.[14]

A meta-analysis on prospective studies of patients undergoing general anesthesia was done by Lee A et al in which the results of preoperative Mallampati test and modified Mallampati test were compared with subsequent rate of difficult intubation. The meta-analysis included forty two studies enrolling 34513 patients. It showed that for predicting difficult intubation modified Mallampati had better accuracy than original Mallampati test. However, they concluded that both the

Mallampati tests had limited accuracy for predicting the difficult airway when used alone and thus were not useful screening tests.[13]

Oates JD et al compared the two methods for predicting difficult intubation prospectively. Mallampati classification and Wilson risk sum were determined before operation in 675 patients. Both tests identified five of 12 difficult laryngoscopies. Interobserver variations was minimal using Wilson risk–sum than Mallampati .They concluded that Wilson risk-sum would be preferred for assessment of airway while noting that both tests have poor sensitivities.[14]

Savva D et al conducted a study on “Prediction of difficult intubation” on 350 consecutive patients scheduled for surgery under general anaesthesia with tracheal intubation and assessed them by measuring thyromental distance and sternomental distance, mandibular protrusion and inter-incision gap with mouth fully open. A sternomental distance of 12.5cm or less with head fully extended and mouth closed predicted difficult tracheal intubation in 14 of 17 patients. According to study sternomental distance appeared more sensitive and more specific than thyromental distance test and mandibular protrusion test. They concluded that sternomental distance may be useful bedside screening test for preoperative prediction of difficult tracheal intubation.[15]

Schmitt et al tested the hypothesis on 270 patients that ratio of patient‘s height to thyromental distance improve the accuracy of predicting difficult laryngoscopy compared to thyromental distance alone .Study concluded that the ratio of 25 for ratio of patient‘s height to thyromental distance was found to be optimal cut off value to predict direct laryngoscopy, when sensitivity of both the test was 0.81 , ratio of patient‘s height to thyromental distance had significantly greater specificity than thyromental distance.[16]

Mashour A et al performed a prospective study on 346 morbidly obese patients and compared the Extended Mallampati score(EMS) with Modified Mallampati classification (MMP) for difficult laryngoscopy. They concluded that Extended Mallampati score was superior to Modified Mallampati classification in the prediction of difficult laryngoscopy. This study also supported that morbid obesity itself was

not a predictor of difficult intubation but a diagnosis of diabetes mellitus was also a predictor of difficult laryngoscopy.[17]

Wajekar et al compared Upper lip bite test ,Mallampati classification and Thyromental distance individually and in various combinations in 402 ASA I and ASA II adult patients undergoing elective surgical procedures requiring endotracheal intubation to verify which of these predictor test were significantly associated with difficult glottic exposure. They concluded that all screening test for difficult intubation have poor to moderate discriminative power when used alone. Combination of test added incremental diagnostic value.[18]

Merah A et al evaluated 380 patients to determine ability to predict difficult visualization of larynx from preoperative airway predictive indices in isolation and combination using modified mallampati test, thyromental distance, sternomental distance and inter incisor gap. During direct laryngoscopy ,the laryngeal view was graded using Cormack and Lehane classification .Cormack and lehane grades III and IV were considered difficult visualization.They concluded that best combination of predicting difficult visualization of larynx were MMT,TMD and IIG.[19]

A retrospective study by Samsoon et al was done on patients whose tracheas were impossible to intubate. They found that there was correlation between the degree of difficulty and the anatomy of the oropharynx in those patient. The study was initially on obstetric patients but was extended to nonobstetric surgical patients in order to increase the number of cases investigated. The incidence of failed intubations in the obstetric group over a 3-year period was seven out of 1980 cases, whereas in the surgical group the results were six out of 13,380 patients. They concluded that any screening test which could add to their ability to predict difficulty in intubation must be welcomed, as failure to intubate can potentially lead to fatalityt.They also suggested that any non invasive clinical test which could identify patients at risk of difficult intubation would be of immense benefit to all anesthetists. [20]

A study was conducted by Bostan et al on five hundred patients to assess Nasal scale: a novel supplemental preoperative airway assessment technique. This study was done in Turkey Eastern black sea region, where a higher incidence of difficult intubation in humans with typical nose structure was observed. They compared the Nasal Scale scores ability to predict difficult intubation with available predictive test such as sternomental distance, thyromental distance and Mallampati classification. They concluded that Nasal Scale is objective and specific test that can be easily applied and can supplement the existing tests.[3]

As we could not find any such study done in our subset of population with the use of nasal scale score as a predictor of difficult intubation, hence we propose to conduct an observational trial comparing Nasal scale score with Modified Mallampati classification, sternomental distance and thyromental distance in terms of predicting difficult intubation as determined by Cormack-Lehane classification.

6.3 AIMS AND OBJECTIVES OF THE STUDY

- To evaluate the predictive potential of Nasal Scale for Difficult Intubation.
- To compare the sensitivity and specificity of Nasal Scale with regard to Modified Mallampati classification, Thyromental distance and sternomental distance.

7. MATERIALS AND METHODS

7.1 SOURCE OF DATA

The study will be conducted in double blind manner in the department of Anaesthesiology at Dayanand Medical College & Hospital, Ludhiana after approval by Institutional Ethics Committee. A written informed consent will be taken by the patient. A total of 200 adult patients above the age of 18 years scheduled for elective surgery under general endotracheal anesthesia will be taken up for the study.

7.2 METHOD OF COLLECTION OF DATA

Inclusion Criterion:

- Patients older than 18 years of age scheduled for elective surgery under general anesthesia requiring endotracheal intubation.

Exclusion Criterion:

- Emergency and Obstetric cases
- Inability to give consent
- Edentulous patients
- Unstable cervical spine or suspected cervical trauma.
- Oromaxillofacial trauma ,massive facial dressings.
- Midline swellings in neck
- Gross anatomical/congenital abnormalities of head and neck
- Patients with full stomach scheduled for emergency surgery or requiring rapid sequence induction.
- Patients with severe cardio respiratory distress

A thorough Pre-anesthetic evaluation comprising of detailed history and physical examination will be conducted a day prior to surgey .A detailed airway assessment including dentition, mouth opening, Modified Mallampati grading, thyromental distance, sternomental distance, neck circumference and Nasal scale score will be done (described in appendix A)

All the patients will be kept fasting at least 8 hrs prior to surgery.All the study participants will receive Tab pantoprazole 40 mg at night and at 6:00 am in the morning on the day of surgery, tab alprazolam 0.25mg HS and at 6:00 am on the day of surgery with sip of water.

Prior to induction of anaesthesia; equipments, anaesthesia machine, required drugs, difficult intubation cart and all resuscitative measures will be checked and kept ready. Patient will be positioned supine on OT table in sniffing position by placing a 15 cm pillow under the occiput. Monitoring in the form of SpO2, HR, ECG, EtCO2 and NIBP will be instituted and continued throughout the study period. After pre-oxygenation for 3 minutes in the supine position ,patient will be induced with intravenous injection propofol 2-3 mg/kg and neuromuscular blockade will be achieved with intubating dose of intravenous injection of Atracurium 0.6mg/kg. After 3 minutes when complete airway relaxation will be achieved, laryngoscopy will be performed using Macintosh blade to visualize the larynx and the view shall be classified using the Modified Cormack Lehane classification. The anesthesiologists performing the laryngoscopy will have an experience of at least 3 years post MD and will be blinded to nasal scale score of the patient. Intubation shall be done with an appropriate sized cuffed endotracheal tube. Confirmation of successful intubation will be done by bilateral auscultation over the lung fields and capnography. At the end of the study anaesthesia will be maintained using the routine technique, followed by extubation and standard postoperative care. Obsevations : Laryngoscopic grading of the best view possible with or without optimal external manipulation will be noted according to the Modified Cormack and Lehane's classification (decribed in appendix B).Modified Cormack and Lehane grades 2b ,3 and 4 will be graded as difficult laryngoscopy. Laryngoscopy and Endotracheal intubation will be considered difficult if any one of the following is positive:-

1 Modified Cormack and Lehane grade 2b, 3 and 4

2 More than 3 attempts at tracheal intubation

3 if special maneuver/multiple blades /special instruments (intubating stillete)//alternative airway devices //multiple laryngoscopists was used to facilitate tracheal intubation.

Outcome:

To evaluate the predictive potential of Nasal Scale for Difficult Intubation

STATISTICAL ANALYSIS

It is assumed that the prevalence rate of difficult intubation as per Cormack Lehane grade 3 and 4 is 12.4% based on study done by Bostan et al.We assumed that if

Assumptions:

Confidence Level = 95%

Precision (d) = ± 5%

For estimation of sample size, the following formula has been used

$n = (Z^2\alpha \times P \times (1-P))/d^2$

Where;

Zα = Value of standard normal variate corresponding to α level of significance

P = Likely value of parameter

Q = 1 – P

d = Margin of errors which is a measure of precision

With these assumptions the sample size works out as 170.so we will take 200 sample size

7.3 DOES THE STUDY REQUIRE ANY INVESTIGATIONS OR INTERVENTIONS TO BE CONDUCTED ON PATIENTS OR OTHER HUMANS OR ANIMALS? IF SO, PLEASE DESCRIBE BRIEFLY.

No

7.4 HAS ETHICAL CLEARENCE BEEN OBTAINED FROM YOUR INSTITUTION IN CASE OF 7.3?

Attached alongwith.

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PROFORMA

Sr. No. -

Name -

Age -

Gender –

MRD –

Religion -

BMI-

Weight -

Height -

Proposed surgery -

AIRWAY ASSESMENT :

Dentition -

Neck movement-

Mouth opening –

Neck circumference

TMJ mobility -

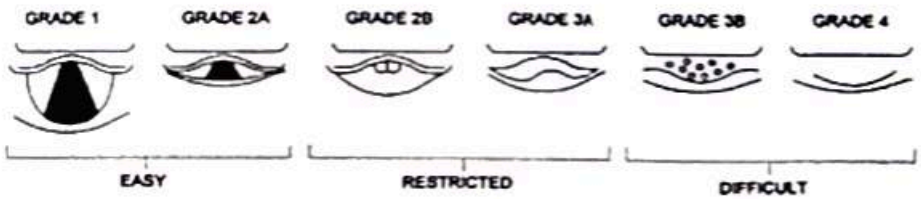
Thyromental distance-

Sternomental distance-

Mallampati classification -

Nasal Scale-

Cormack Lehane classification-



Attempts of tracheal intubation :

Signature of Candidate

Signature of Supervisor

Use of special maneuver

- Change of laryngoscopic blade
- Use of intubating stillete
- Alternative airway devices to facilitate tracheal intubation.

Signature of Candidate **Signature of Supervisor**

APPENDIX A

1.Weight : It will be measured in Kilograms usinga standard weighing machine

2.Height : It will be measured using centimeters using a standard measuring tape

3 Dentition

4 Mouth opening : It will be recorded as the distance between the distance between upper and lower incisors with the mouth fully open using a standard measuring scaleit will be evaluated using 3 levels.1 IG <3.5 cm
2 IG 3.5-5 cm
3 IG >5 cm

5 Modified Mallampaticlassification :

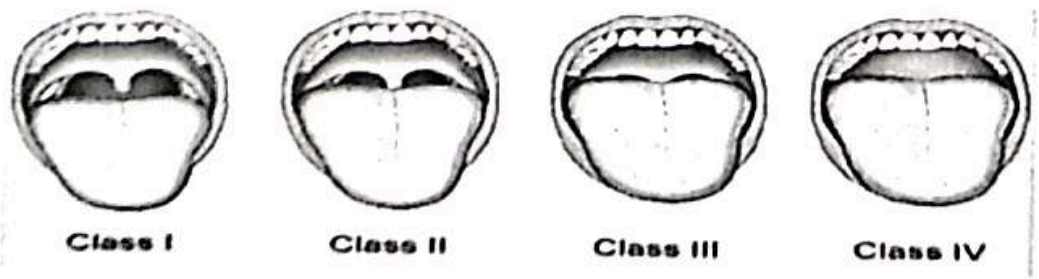
Mallampati classification is widely used bed side test. Patients will be placed in sitting position ,with their head in neutral position , mouth fully open , tongue protruded maximally , no phonation and with the examiner eye to eye position. Mallampati Classification is scored as

Class 1 soft palate ,fauces ,uvula ,pillars visible

Class 2 soft palate ,fauces ,uvula ,pillars

Class 3 soft and base of uvula visible

Class 4 soft palate not visible at all.



Signature of Candidate **Signature of Supervisor**

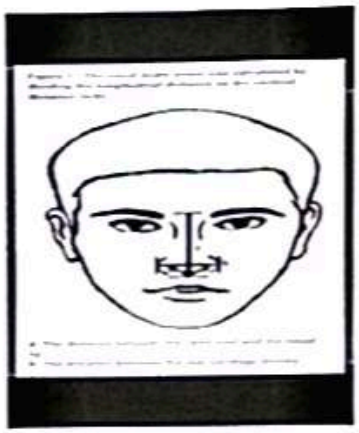
6THYROMENTAL DISTANCE

It is the straight distance between upper border of Thyroid cartilage and a bony point of mentum is measured .Thyromental distance of < 6.5 is the prediction criteria for difficult Intubation.

7STERNOMENTAL DISTANCE

It is measured in supine position with head fully extended and mouth closed . The straight distance between upper border of manubrium sterni and bony point of mentum is measured .Sternomental distance of less than 13 cm is considered as difficult intubation.

8 NASAL SCALE



The longitudinal distance (distance between radixnasii and nasal tip) and horizontal distance (distance between nasal domes) are measured . Nasal Scale is calculated by dividing the longitudinal distance by horizontal distance and expressed as range of 1.22-2.3.According to study done by Bostan H et al , Nasal score of less than 1.4 is considered as a predictor of difficult intubation.

9 NECK CIRCUMFERENCE

It will be measured in centimeters at the level of hyoid cartilage with a standard measuring tape.

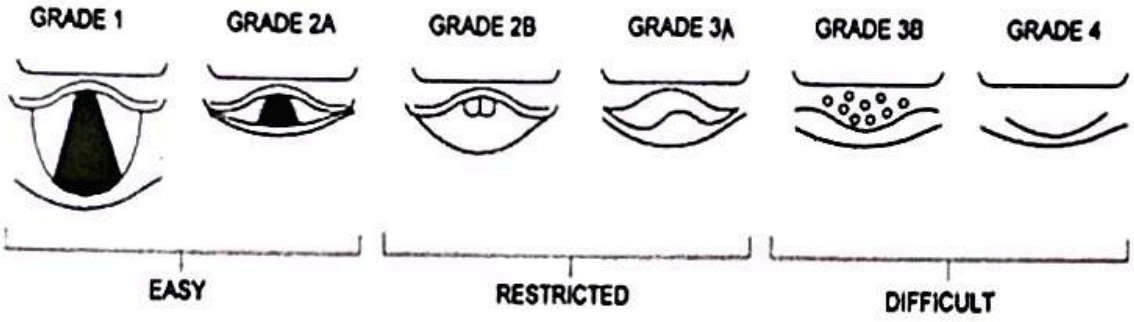
Signature of Candidate **Signature of Supervisor**

APPENDIX B

Modified Cormackand Lahane grading of the laryngoscopic is done as

- Grade 1 Full view of vocal cords
- Grade 2a Partial view of vocal cords
- Grade 2b View of arytenoid cartilage only
- Grade 3 View of epiglottis only , no vocal cords
- Grade 4 View of soft palate only , no epiglottis

CORMACK LAHANE of Grade 3 and 4 is accepted as Difficult intubation.



Signature of Candidate **Signature of Supervisor**

INFORMED PATIENT CONSENT

Date: _____

I.....D/o, W/o,
S/o..... .....am willing to participate in the study **"ASSESSMENT OF NASAL SCALE AS A PREDICTOR OF DIFFICULT INTUBATION"** The procedure with its complications has been explained to me in local vernacular language. I have fully understood that no special tests or extra expenditure in any form, merely for the purpose of thesis is being carried out. I am free to opt out of the study any time without assigning any reason.

....
Signature of the Witness Signature of the patient

Name:

Signature of Supervisor **Signature of Candidate**

मरीज अनुमति फार्म

तिथि _____

मैं _____ पत्नी/पुत्र/पुत्री _____ निवासी _____ इस शोधकार्य **"ASSESSMENT OF NASAL SCALE AS A PREDICTOR OF DIFFICULT INTUBATION"** में भाग लेने के लिए सहमत हूँ। मैं इस शोधकार्य में भाग लेने के लिए अपनी स्वेच्छा से तैयार हूँ। मैं पुष्टि करता/करती हूँ की यह स्वीकृति देने के लिए मुझे कोई आर्थिक प्रलोभन नहीं दिया गया और न ही दबाव डाला गया है। मुझे इस शोधकार्य का उद्देश्य स्पष्ट कर दिया गया है और मुझे यह विश्वास है की यह विज्ञान और मानवता के लाभ के लिए है। मुझे इस शोधकार्य में होने वाले जोखिम के बारे में समझा दिया गया है और मेरी समझ में यह जोखिम बहुत मामुली है।

मैं इस शोधकार्य में भाग लेने के सम्बन्ध में किसी भी समय अपनी अस्वीकृति व्यक्त कर सकता/सकती हूँ और मेरे अस्वीकृति व्यक्त करने का मेरे इलाज पर कोई प्रभाव नहीं पड़ेगा।

_____ _____

गवाह के हस्ताक्षर रोगी के हस्ताक्षर/अंगूठे का निशान

नाम: नाम:

_____

अन्वेषक के हस्ताक्षर

_____

विद्यार्थी के हस्ताक्षर

ਮਰੀਜ਼ ਰਜ਼ਾਮੰਦੀ ਫਾਰਮ

ਮਿਤੀ_____

ਮੈ_____ਪਤਨੀ/ਪੁੱਤਰ/ਪੁੱਤਰੀ_____ਵਾਸੀ

_____

"ASSESSMENT OF NASAL SCALE AS A PREDICTOR OF DIFFICULT INTUBATION" ਤੇ ਚਲ ਰਹੀ ਖੋਜ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਰਜ਼ਾਮੰਦ ਹਾਂ। ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਮੈ ਆਪਣੀ ਮਰਜ਼ੀ ਨਾਲ ਤਿਆਰ ਹਾਂ। ਮੈ ਇਹ ਦਸਣਾ ਚਾਹੁੰਦਾ ਹਾਂ/ ਚਾਹੁੰਦੀ ਹਾਂ ਕੇ ਇਹ ਰਜ਼ਾਮੰਦੀ ਦੇਣ ਵਾਸਤੇ ਮੈਨੂ ਕਿਸੇ ਵੀ ਤਰਾਂ ਦਾ ਲੋਭ-ਲਾਲਚ ਨਹੀ ਦਿੱਤਾ ਗਿਆ ਅਤੇ ਨਾ ਹੀ ਕੋਈ ਦਬਾ ਪਾਇਆ ਗਿਆ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਦਾ ਮਨੋਰਥ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਭਰੋਸਾ ਦਵਾਇਆ ਗਿਆ ਹੈ ਕੇ ਇਹ ਖੋਜ ਵਿਗਿਆਨ ਅਤੇ ਮਾਨਵਤਾ ਦੀ ਭਲਾਈ ਲਈ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਵਿਚ ਹੋਣ ਵਾਲੇ ਖਤਰੇ ਬਾਰੇ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਯਕੀਨ ਹੈ ਕੇ ਇਹ ਖਤਰਾ ਬਹੁਤ ਮਾਮੂਲੀ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਦਾ ਢੰਗ – ਤਰੀਕਾ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ।

ਮੈ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਬਾਰੇ ਆਪਣੀ ਰਜਾਮੰਦੀ ਕਿਸੇ ਵੀ ਸਮੇ ਵਾਪਸ ਲੈ ਸਕਦਾ ਹਾਂ/ ਸਕਦੀ ਹਾਂ ਅਤੇ ਮੇਰੀ ਰਜਾਮੰਦੀ ਵਾਪਸ ਲੈਣ ਦਾ ਮੇਰੇ ਇਲਾਜ ਤੇ ਕੋਈ ਅਸਰ ਨਹੀ ਹੋਵੇਗਾ।

_____ _____

ਗਵਾਹ ਦੇ ਹਸਤਾਖਰ ਮਰੀਜ਼ ਦੇ ਹਸਤਾਖਰ

ਮਿਤੀ_____ ਮਿਤੀ_____

ਪਤਾ _____ ਪਤਾ _____

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ਨਿਰੀਖਕ ਦੇ ਹਸਤਾਖਰ

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ਸਿਖਿਆਰਥੀ ਦੇ ਹਸਤਾਖਰ